This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

**Usage guidelines**

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

**About Google Book Search**

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

University of Wisconsin
LIBRARY
Class Snd
Book C85

# TABLES

# FOR THE COMPUTATION

OF

# Railway and Other Earthwork,

COMPUTED BY

C. L. CRANDALL, C. E.,

*Associate Professor of Civil Engineering, Cornell University;*
*Member of American Society of Civil Engineers.*

---

*SECOND EDITION.*

---

NEW YORK:
JOHN WILEY & SONS,
53 EAST TENTH STREET.
1893.

COPYRIGHT, 1893,
BY CHARLES L. CRANDALL.

ANDRUS & CHURCH,
PRINTERS,
ITHACA, N. Y.

EZ20 #54

34592

SND
C85

# Preface to the First Edition.

THE object of these tables is to present a convenient aid in the Computation of Railway Earthwork. The volume is first found by the approximate method of averaging end areas, to which can be added, if desired, a correction due to the strict prismoidal formula, or a correction due to a modification of it for irregular ground. This separation reduces the labor, if both parts are computed at once, while it allows of computing only the approximate value at first, which will answer for all purposes except the final estimate, leaving the prismoidal correction to be computed at leisure on those volumes only where it is large enough to be appreciable.

The Table for "Volume by Averaging End Areas," is a table for triangular prisms, and it will give the approximate volume of triangular prismoids in cubic yards for a length of one hundred feet, between the parallel triangular ends, by taking the sum of the two numbers found with the base and altitude of each of the two end triangles as arguments. The table is thus independent of side slope, or width of roadbed, and will apply to borrow pits, trenches, etc., by dividing up the cross sections into triangles and trapezoids.

The method of dividing up the sections for three-level, five-level and irregular ground, while not essential, is believed to give the least labor in computing, either with or without tables.

The method for irregular ground is due to J. W. Davis, and was published in his *Formula for R. R. Earthwork*, 1876.

The Table for "Prismoidal Correction" is a table for triangular prismoids, and it will give the exact correction to be applied to the approximate volume found above for all solids which can be divided into triangular prismoids, having plane parallel ends, and planes or hyperbolic paraboloids for side faces. By using A. M. Wellington's method for irregular ground, that for the purposes of the prismoidal correction only, the ground may be called regular, the correction is easily and quickly applied, to three-level, five-level, and irregular ground. It may be noted that when either the bases or altitudes of the end triangles are equal, the correction disappears.

While quantities are only given for full feet the corrections for tenths are easily taken out from the margin without multiplication and can be added mentally with but slight increase of labor.

The Tables have been carefully recomputed in print, and it is confidently believed they are free from errors.

## PREFACE TO THE SECOND EDITION.

The first edition was not electrotyped, and advantage has been taken of this to entirely recast the text, adding a proof of the prismoidal formula and a comparison with others in use, a formula for correction for curvature, and rules for cross sectioning.

ITHACA, N. Y., August, 1893.

# Contents.

## DERIVATION OF PRISMOIDAL FORMULA AND COMPARISON WITH OTHERS IN USE.


| SEC. | | PAGE. |
|---|---|---|
| 1. | Prismoidal Formula | 1 |
| 2. | Averaging End Areas | 2 |
| 3. | Middle Areas | 3 |
| 4. | Equivalent Mean Heights | 3 |
| 5. | Triangular Prismoid with Curved Center Line | 4 |


### VOLUME FOR RAILWAY EARTHWORK IN CUBIC YARDS BY AVERAGING END AREAS.


| | | |
|---|---|---|
| 6. | Formula for Three-level Ground | 7 |
| 7. | Five-level Ground | 7 |
| 8. | Irregular Ground | 8 |
| 9. | Tables | 10 |
| 10. | Example, Three level Ground | 11 |
| 11. | Example, Five-level Ground | 11 |
| 12. | Example, Irregular Ground | 12 |
| 13. | Borrow Pits | 13 |
| 14. | Sidehill Work | 13 |
| 15. | End Sections | 14 |
| 16. | Correction for Curvature | 14 |
| 17. | Example, Correction for Curvature | 16 |


### PRISMOIDAL CORRECTION IN CUBIC YARDS.


| | | |
|---|---|---|
| 18. | Three-level Ground | 17 |
| 19. | Five-level Ground | 17 |
| 20. | Irregular Ground, Borrow Pits, etc. | 17 |
| 21. | Table of Prismoidal Corrections | 18 |
| 22. | Example, Three-level Ground | 18 |
| 23. | Example, Five-level Ground | 19 |
| 24. | Example, Irregular Ground | 19 |
| 25. | Example, Borrow Pits | 20 |


### COMPUTATION, END AREAS WITH PRISMOIDAL CORRECTION.


| | | |
|---|---|---|
| 26. | Three-level Ground | 21 |
| 27. | Irregular Ground | 21 |
| 28. | Rules for cross-sectioning | 23 |

Table of Triangular Prismoids for Railway Earthwork, in cubic yards, by Averaging End Areas.

Table of Prismoidal Corrections for Triangular Prismoids for Railway Earthwork.

# Derivation of Prismoidal Formula and Comparison with Others in Use.

1. **Prismoidal Formula.**—In computing railway earthwork, it is customary to measure sections perpendicular to the center line at stations 100 feet apart, and at as many intermediate points as may be found necessary.

To find the volume between two such parallel sections:

Take at first the simple case shown in Fig. 1, where the section is straight from the center to the slope stake on each side, and where straight lines joining corresponding points of the upper lines of the sections lie in the ground surface. The ground surface thus formed is a hyperbolic paraboloid, a characteristic property of which is that all planes parallel to the end sections cut the surface in straight lines, whose increments (or decrements) in length, starting from either end, are proportional to their distances from that end.

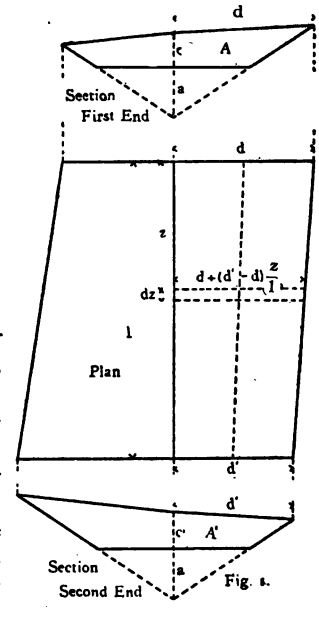


Fig. 1.

With the notation of Fig. 1, the area of the right-hand side of the first section (including the grade triangle under the roadbed),

$$A = \tfrac{1}{2}(a + c)d.$$

At the distance $z$, since all the linear dimensions of the section can be interpolated,

$$A_z = \tfrac{1}{2}\left[a + c + (c' - c)\frac{z}{l}\right]\left[d + (d' - d)\frac{z}{l}\right] \qquad (a)$$

Elementary volume of length $dz$ = area into length

$$= A_z\, dz.$$

Integrating between the limits $z = 0$ to $z = l$,

$$\text{Volume} = \int_0^l A_z\, dz$$

$$= \tfrac{1}{2}\left[(a+c)dz+(a+c)(d'-d)\frac{z^2}{2l}+d(c'-c)\frac{z^2}{2l}+(c'-c)(d'-d)\frac{z^3}{3l^2}\right]_0^l$$

$$= \tfrac{1}{2}\left[(a+c)dl+(a+c)(d'-d)\frac{l}{2}+d(c'-c)\frac{l}{2}+(c'-c)(d'-d)\frac{l}{3}\right]$$

$$\text{Volume} = \frac{a+c}{2}\frac{dl}{6}+\frac{a+c'}{2}\frac{d'l}{6}$$

$$+\frac{a+c}{2}dl\frac{5}{6}+\frac{a+c}{2}\frac{d'l}{3}+\frac{c'-c}{2}\frac{d'l}{6}-\frac{a+c}{2}\frac{dl}{2}+\frac{c'-c}{2}\frac{dl}{6}$$

$$= A\frac{l}{6}+A'\frac{l}{6}+\frac{a}{2}\frac{d+d'}{2}4\frac{l}{6}+\frac{c+c'}{4}\frac{d+d'}{2}4\frac{l}{6}, \text{ or}$$

$$\text{Vol.} = (A+A'+4A_m)\frac{l}{6} \qquad (1)$$

where $A_m$ is the area of the mid section found by making $z = l \div 2$ in (a).

1. e., *the true volume equals the sum of the areas of the end sections and four times that of the mid section, multiplied by one-sixth the perpendicular length between sections.*

This is the prismoidal formula, and the first proof of its application to an earthwork solid, as above, is due to Professor Gillespie.*

It is evident that an earthwork solid with polygonal end sections lying in parallel planes can be divided into solids with triangular bases as above, when there are the same number of sides in the end polygons and lines joining corresponding points of these sections lie in the bounding surfaces; therefore the prismoidal formula will give the true volume for all such solids. The solid thus described will be called a *prismoid*; *i. e.*, a prismoid will be defined as a solid having two plane polygonal parallel bases with the same number of sides in each, joined by either planes or hyperbolic paraboloids for side faces. With triangles for bases, the prismoid becomes a *triangular prismoid.*

2. **Averaging End Areas.**—This is a method in common use on account of its simplicity. Applying it to the triangular prismoid of § 1, and including the grade triangle for simplicity,

By averaging end areas,

$$\text{Vol.}_e = \frac{A+A'}{2}l$$

$$= \left[\frac{a+c}{2}d+\frac{a+c'}{2}d'\right]\frac{l}{2}.$$

True volume by the prismoidal formula,

$$\text{Vol.}_p = \frac{a+c}{2}d\frac{l}{6}+\frac{a+c'}{2}d'\frac{l}{6}+\frac{a}{2}\frac{d+d'}{2}\frac{2l}{3}+\frac{c+c'}{4}\frac{d+d'}{2}\frac{2l}{3}$$

Subtracting $\text{Vol.}_e$ from the true value, $\text{Vol.}_p$,

$$\text{Vol.}_p - \text{Vol.}_e = -\frac{a+c}{2}d\frac{l}{3}-\frac{a+c'}{2}d'\frac{l}{3}+\frac{d+d'}{2}a\frac{l}{3}+\frac{c+c'}{2}\frac{d+d'}{2}\frac{l}{3}$$

---

* See *Roads and Railroads*, New York, 1847.

$$\text{Cor.}_e = (c-c')(d'-d)\frac{l}{12} \qquad (2)$$

where $\text{Cor.}_e$ is the correction to be applied to the volume found by averaging end areas in order to obtain the true volume.

Usually in passing from lighter to heavier work $c' > c$ and $d' > d$ (or conversely from heavier to lighter), making the above correction usually negative; *i. e.*, the method by averaging end areas gives on the average too large a volume.

3. **Middle Areas.**—The linear dimensions of the mid section will be the means of those of the end sections, giving

$$\text{Vol.}_m = \tfrac{1}{2}\left(a + \frac{c+c'}{2}\right)\frac{d+d'}{2}\,l$$

Subtracting this from the true value,

$$\text{Vol.}_p - \text{Vol.}_m = -\frac{a}{2}(d+d')\frac{l}{3} - \frac{cdl}{24} - \frac{c'd'l}{24} - \frac{cd'l}{8} - \frac{c'dl}{8} + \frac{a}{2}(d+d')\frac{l}{3} + \frac{c+c'}{4}(d+d')\frac{l}{3}$$

$$\text{Cor.}_m = (c-c')(d-d')\frac{l}{24} \qquad (3)$$

where $\text{Cor.}_m$ is the correction to be applied to the volume found by middle areas in order to obtain the true volume.

This correction is one-half that found by averaging end areas, and has the opposite sign, *i. e.*, the method on the average gives results too small, but the error is only one-half as great as by the preceding method.

4. **Equivalent Mean Heights.**—In this method the center height of a level section having an equal area is found for each end section,

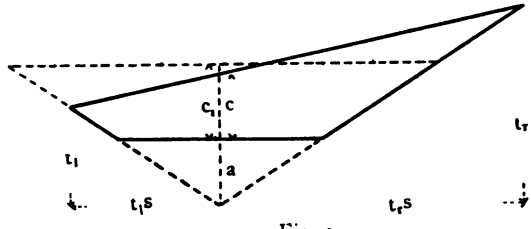



Fig. 2.

and the volume of the reduced solid is then accurately found by the prismoidal formula.

Applying this to two-level ground, with slope stake heights $t_l$, $t_r$, slope ratio $s$, reduced center height $c_1$, and distances out to slope stakes $t_l s$ and $t_r s$,

$$A = \tfrac{1}{2}(t_l+t_r)(t_l+t_r)s - \tfrac{1}{2}t_l^2 s - \tfrac{1}{2}t_r^2 s = t_l t_r s$$

From the reduced area,

$$A = (a+c_1)^2 s$$

or,

$$a+c_1 = \sqrt{t_l t_r}$$

The true volume of the *reduced* solid,

$$\text{Vol.}_{\text{e.m.h.}} = (A+A'+4A'_{\text{m}})\frac{l}{6}$$

$$= \left[(a+c_{\text{r}})^2+(a+c_{\text{r}}')^2+4\left(\frac{a+c_{\text{r}}}{2}+\frac{a+c_{\text{r}}'}{2}\right)^2\right]\frac{s\,l}{6}$$

$$= \left[t_1 t_{\text{r}}+t_1' t_{\text{r}}'+(\sqrt{t_1 t_{\text{r}}}+\sqrt{t_1' t_{\text{r}}'})^2\right]\frac{s\,l}{6}$$

The true volume of the original solid,

$$\text{Vol.}_{\text{p}} = (A+A'+4A_{\text{m}})\frac{l}{6}$$

$$= \left[t_1 t_{\text{r}}+t_1' t_{\text{r}}'+4\left(\frac{t_1+t_1'}{2}\times\frac{t_{\text{r}}+t_{\text{r}}'}{2}\right)\right]\frac{s\,l}{6}$$

$$= [2t_1 t_{\text{r}}+2t_1' t_{\text{r}}'+t_1 t_{\text{r}}'+t_1' t_{\text{r}}]\frac{s\,l}{6}$$

Subtracting the volume of the reduced solid from that of the original one,

$$\text{Vol.}_{\text{p}}-\text{Vol.}_{\text{e.m.h.}} = [t_1 t_{\text{r}}'-2\sqrt{t_1 t_{\text{r}} t_1' t_{\text{r}}'}+t_1' t_{\text{r}}]\frac{s\,l}{6},$$

or,
$$\text{Cor.}_{\text{e.m.h.}} = (\sqrt{t_1 t_{\text{r}}'}-\sqrt{t_1' t_{\text{r}}})^2\frac{s\,l}{6} \qquad (4)$$

The correction is thus always positive, *i, e.*, the method always gives too small a result for two-level ground, except when $t_1 t_{\text{r}}' = t_1' t_{\text{r}}$; hence it will usually give too small results for ordinary ground.

5. **Triangular Prismoid with Curved Center Line.**—In curving the center line of the roadbed to the radius $R$, let the dimensions of

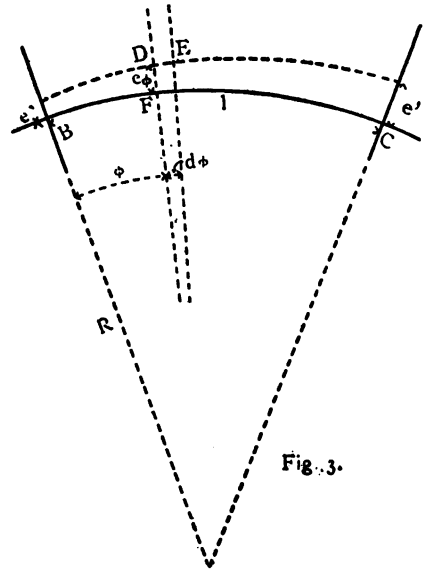



Fig. 3.

all the cross sections remain unchanged. This will give the solid easiest to approximate in the field, and the one most like the prismoid, since all lineal dimensions of the cross section can be interpolated.

In Fig. 3, let $B\,C$ be the center line of the roadbed; $e$, $e_\phi$, $e'$, the eccentricities of the sections, or the distances of their centers of gravity from the center of the roadbed; $A$, $A_\phi$, $A'$, the areas of the triangular sections, with bases $b$, $b_\phi$, $b'$, and altitudes $a$, $a_\phi$, $a'$; $\phi$ the central angle from $B$ to any point $F$; $l$ the length $B\,C$ of the solid along the center line of the roadbed, $= R\phi'$.

At any point $D$,

$$\text{Elementary volume} = A_\phi \overline{D\,E} = A_\phi\,(R + e_\phi)\,d\phi$$

$$\text{Volume} = \int_0^{\phi' = \frac{l}{R}} A_\phi\,(R + e_\phi)\,d\phi$$

Since all cross section dimensions can be interpolated,

$$A_\phi = \tfrac{1}{2}\left[b + (b' - b)\frac{\phi R}{l}\right]\left[a + (a' - a)\frac{\phi R}{l}\right]$$

$$e_\phi = e + (e' - e)\frac{\phi R}{l}$$

Substituting,

Volume =

$$\int_0^{\phi' = \frac{l}{R}} \tfrac{1}{2}\left[b + (b' - b)\frac{\phi R}{l}\right]\left[a + (a' - a)\frac{\phi R}{l}\right]\left[R + e + (e' - e)\frac{\phi R}{l}\right]d\phi$$

$$= \tfrac{1}{2}\left[\left[ab\phi + a(b' - b)\frac{\phi^2 R}{2l} + b(a' - a)\frac{\phi^2 R}{2l} + (a' - a)(b' - b)\frac{\phi^3 R^2}{3l^2}\right] R\right.$$

$$+ \left[ab\phi + a(b' - b)\frac{\phi^2 R}{2l} + b\,(a' - a)\frac{\phi^2 R}{2l} + (a' - a)\,(b' - b)\frac{\phi^3 R^2}{3l^2}\right] e$$

$$+ \left[ab\frac{\phi^2}{2} + a(b' - b)\frac{\phi^3 R}{3l} + b(a' - a)\frac{\phi^3 R}{3l} + \right.$$

$$\left.\left.(a' - a)(b' - b)\frac{\phi^4 R^2}{4l^2}\right](e' - e)\,\frac{R}{l}\right]_0^{\phi' = \frac{l}{R}}$$

$$= \tfrac{1}{2}l\left[ab + a(b' - b)\,\tfrac{1}{2} + b(a' - a)\,\tfrac{1}{2} + (a' - a)(b' - b)\,\tfrac{1}{3}\right.$$

$$+ \left[ab + a(b' - b)\,\tfrac{1}{2} + b(a' - a)\,\tfrac{1}{2} + (a' - a)(b' - b)\,\tfrac{1}{3}\right]\frac{e}{R}$$

$$\left.+ \left[ab\,\tfrac{1}{2} + a(b' - b)\,\tfrac{1}{3} + b(a' - a)\,\tfrac{1}{3} + (a' - a)(b' - b)\,\tfrac{1}{4}\right]\frac{(e' - e)}{R}\right]$$

$$= \frac{l}{6}\left[ab + \tfrac{1}{2}ab' + \tfrac{1}{2}a'b + a'b'\right.$$

$$+ (ab + \tfrac{1}{2}ab' + \tfrac{1}{2}a'b + a'b')\,\frac{e}{R}$$

$$\left.+ (\tfrac{1}{4}ab + \tfrac{1}{4}ab' + \tfrac{1}{4}a'b + \tfrac{3}{4}a'b')\,\frac{e' - e}{R}\right]$$

$$=\frac{l}{6}\left[(A+4A_m+A')+(A+4A_m+A')\frac{e}{R}+(2A_m+A')\frac{e'-e}{R}\right]$$

Volume

$$=\frac{l}{6}(A+4A_m+A')+\frac{l}{6R}\left[(A+2A_m)e+(2A_m+A')e'\right] \quad (5)$$

where $A_m$ is the area of the mid section, and $e$, $e'$, are positive for the convex side of the curve.

The first product is the volume which would be obtained by the prismoidal formula neglecting curvature, leaving the second for the correction due to curvature.

# Volume for Railway Earthwork

## IN CUBIC YARDS BY AVERAGING END AREAS.

6. **Formula for Three-level Ground.**—Dimensions in feet, volume in cubic yards.

$$\text{Area of section} = (a+c)\frac{d_l}{2} + (a+c)\frac{d_r}{2} - \frac{a\,b}{2}$$

$$= (a+c)\frac{w}{2} - \frac{a\,b}{2}$$

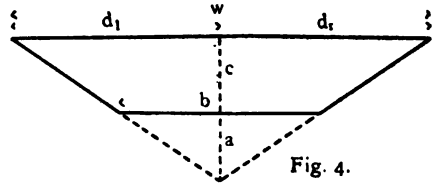


Fig. 4.

At the next section, 100 feet from the first, priming corresponding parts,

$$\text{Area}' = (a+c')\frac{w'}{2} - \frac{a\,b}{2}$$

Multiplying the average area by the length, and dividing by 27 to reduce to cubic yards,

$$\text{Volume} = (\text{area} + \text{area}')\frac{100}{2 \times 27}$$

$$\text{Volume} = (a+c)\,w\,\tfrac{50}{54} - ab\,\tfrac{50}{54} + (a+c')\,w'\,\tfrac{50}{54} - ab\,\tfrac{50}{54}. \qquad (6)$$

*I. e.*, the effect of each cross section on the volume reduces to *the constant times the total width between slope stakes times the sum formed by adding the center height to the height of the grade triangle; minus the constant times the base times the altitude of the grade triangle.*

For the next solid,

$$\text{Volume}' = (\text{area}' + \text{area}'')\,\tfrac{100}{54}.$$

The terms comprising *area'* should therefore be added separately, for convenience in finding the second volume, etc.

7. **Five-level Ground.**—In five-level ground the intermediate heights, $t_l$ and $t_r$, are taken over (or under) the edges of the roadbed. By joining the edges of the roadbed with the ground at the center, two triangles are formed on the left having $t_l$ for the common base, $d_l$ for

the sum of the altitudes, and $t_l d_l$ for double area ; two on the right with double area $t_r d_r$ ; and one at the center with double area $bc$.

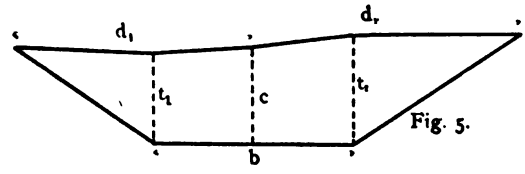


Fig. 5.

Therefore, Area first end $= \frac{t_l d_l}{2} + \frac{t_r d_r}{2} + \frac{bc}{2}$

Area second end $= \frac{t_l' d_l'}{2} + \frac{t_r' d_r'}{2} + \frac{bc'}{2}$

$$\text{Volume} = t_l d_l \tfrac{50}{54} + t_r d_r \tfrac{50}{54} + c b \tfrac{50}{54} + t_l' d_l' \tfrac{50}{54} + t_r' d_r' \tfrac{50}{54} + c' b \tfrac{50}{54}. \quad (7)$$

I. e., the effect of each cross section on the volume reduces to *the constant times the distance out to the left slope stake times the left shoulder height ; plus the constant times the distance out to the right slope stake times the right shoulder height ; plus the constant times the width of roadbed times the center height.*

8. **Irregular Ground.**—In Fig. 6, let $d_l$, $f_l$, $g_l$ . . . , and $d_r$, $f_r$, $g_r$ . . . = the distances to the left, and right, to the slope stakes, and intermediate breaks in the ground surface ; and $r_l$, $u_l$, $t_l$ . . . , and $r_r$, $u_r$, $t_r$ . . . , = the corresponding heights.

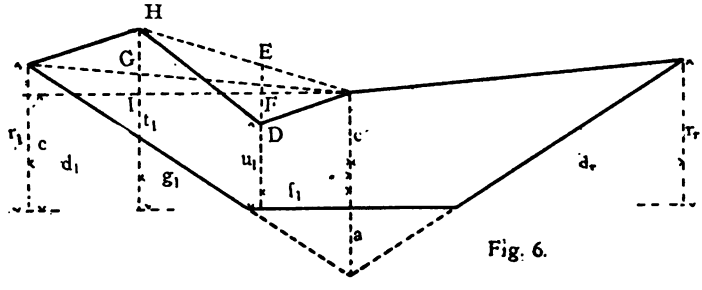


Fig. 6.

The area of the section may be found, by taking the two triangles with the common base $a + c$, and altitudes $d_l$ and $d_r$, adding the triangle with area $GH \cdot \frac{d_l}{2}$, and subtracting the triangle with area $DE \cdot \frac{g_l}{2}$, and the grade triangle $\frac{ab}{2}$. This gives,

Area first end (the right side being regular)

$$= (a+c)\frac{d_l}{2} + \overline{GH}\cdot\frac{d_l}{2} - \overline{DE}\cdot\frac{g_l}{2} \pm \text{etc.} \quad + (a+c)\frac{d_r}{2} - \frac{ab}{2}$$

$$= (a+c)\frac{d_l}{2} + (t_l - c - \overline{IG})\frac{d_l}{2} + (u_l - c - \overline{FE})\frac{g_l}{2} + \text{etc.} \quad + (a+c)\frac{d_r}{2} - \frac{ab}{2},$$

where $IG$ and $FE$ are to be taken as negative if measured below the horizontal line $FI$. Expressing them in terms of measured quantities, since $IG = (r_1 - c)\frac{g_1}{d_1}$ and $FE = (t_1 - c)\frac{f_1}{g_1}$,

Area first end

$$= (a+c)\frac{d_1}{2} + \left[t_1 - c - (r_1 - c)\frac{g_1}{d_1}\right]\frac{d_1}{2} + \left[u_1 - c - (t_1 - c)\frac{f_1}{g_1}\right]\frac{g_1}{2} + \text{etc.}$$
$$+ (a+c)\frac{d_r}{2} - \frac{ab}{2}$$

$$= (a+t_1)\frac{d_1}{2} + (u_1 - r_1)\frac{g_1}{2} + (c - t_1)\frac{f_1}{2} + \text{etc.} + (a+c)\frac{d_r}{2} - \frac{ab}{2},$$

where each break or intermediate height $H$, $D$, etc., adds a term of the form $(u_1 - r_1)\frac{g_1}{2}$. If $H$ is omitted, the corresponding term $(u_1 - r_1)\frac{g_1}{2}$ disappears and the other term becomes $(c - r_1)\frac{f_1}{2}$, as may be found by leaving off the triangle $GH \cdot \frac{d_1}{2}$; if $H$ and $D$ are omitted both terms disappear, and $(a+t_1)\frac{d_1}{2}$ becomes $(a+c)\frac{d_1}{2}$, as may be seen from the expression for the right side.

If the next cross section, 100 feet distant, is similar to the first, and the same letters with primes are used for corresponding parts, we shall have,

Area second end,

$$= (a+t_1')\frac{d_1'}{2} + (u_1' - r_1')\frac{g_1'}{2} + (c' - t_1')\frac{f_1'}{2} + \text{etc.} + (a+c')\frac{d_r'}{2} - \frac{ab}{2}.$$

The volume will be found by multiplying the average area by the length, and dividing by 27 to reduce to cubic yards.

$$\text{Volume in cubic yards} = (\text{area} + \text{area}')\frac{100}{2 \times 27}.$$

Substituting the value of each end area,

Volume

$$= (a+t_1)d_1\tfrac{50}{54} + (u_1 - r_1)g_1\tfrac{50}{54} + (c - t_1)f_1\tfrac{50}{54} + \text{etc.} + (a+c)d_r\tfrac{50}{54} - ab\tfrac{50}{54}$$
$$+ (a+t_1')d_1'\tfrac{50}{54} + (u_1' - r_1')g_1'\tfrac{50}{54} + (c' - t_1')f_1'\tfrac{50}{54} + \text{etc.} + (a+c')d_r'\tfrac{50}{54} - ab\tfrac{50}{54} \quad (8)$$

Or, the effect of each cross section on the volume reduces:

*For the irregular side; to a constant times the distance to the slope stake times the sum formed by addiug the height next the slope stake to that of the grade triangle; plns the constant times the distance out to each break, in turn, times the difference formed by subtracting the first height outside from the first height inside that break.*

*For the regular side; to the constant times the distance out to the slope stake times the sum formed by adding the center height to the height of the grade triangle.*

***From the total sum must be subtracted the constant times the base times the altitude of the grade triangle.***

For the next solid,

$$\text{Volume} = (\text{area}' + \text{area}'')\frac{100}{2 \times 27};$$

the terms comprising *area'* should therefore be added separately, for convenience in finding the second volume, etc.

It may be noted that, if the expressions for the areas of the original triangles had not been reduced, the constant times the base times the altitude of each, would appear as its effect upon the volume. Hence ***the computer may divide the sections into any triangles he may wish;*** the volume will result by multiplying the constant into the base times the altitude of each triangle, and adding the products.

9. **Tables.**—The table gives the value of $(a + c)\,d\,\frac{50}{54}$ (or $t\,d\,\frac{50}{54}$), for $a + c$ (height) and $d$ (width) as arguments; or it gives the effect which any triangle in the cross section has upon the volume, for a length between stations of 100 feet, by using the altitude and base of the triangle as arguments. After looking out the partial volume for each triangle for both ends and adding, if the length be not 100, multiply the sum by $\frac{1}{100}$ of the length.

To look out the partial volume for a triangle:—Find the integral part of the height factor in the line of height headings at the top of the page; then move down this column until opposite the integral part of the width factor in the width column and note the number; then move to the left on this line (or the next below if the tenths of width be greater than 5) and take out the "Correction for tenths of height"; them move to the bottom of the page and under the column first used (or the next to the right if the tenths of height be greater than 5) take out the "Correction for tenths of width." Take the sum of the three mentally. Look out the quantity for each of the other terms; the algebraic sum will be the total volume. The terms coming from "area second end," should be kept separate as they will be used in finding the volume of the next solid.

If one of the arguments cannot be found in the table divide it by two, look out the number and multiply by two; if both cannot, divide each by two and multiply by four.

In order to impress upon the mind the fact that the correction for tenths of width is placed under the height column, it should be remembered that the differences down the column are constant, so that corrections or proportional parts of these differences can be placed under it, but the widths are increased as we move down the column, or these corrections are for tenths of width. Similarly for the lines horizontally, or the corrections for tenths of height.

After becoming familiar with the table, it will often save time to call height "width," and width "height," and to take the correction for tenths from the side or bottom of the page as most convenient, *provided* always that it is opposite (or under) the heading number to which it belongs.

10. **Example, Three-level Ground.**—

| Sta. | Center. | Left. | Right. |
|---|---|---|---|
| 20 | 10.8, | $\frac{8.4*}{19.6}$, | $\frac{11.4}{24.1}$ |
| 21 | 24.2, | $\frac{11.1}{23.7}$, | $\frac{32.6}{55.9}$ |
| 21 + 20 | 46.7, | $\frac{20.0}{37.0}$, | $\frac{50.6}{82.9}$ |

$a = 4.7$, $b = 14$. †

Substituting in formula (6), or following the rule § 6, we shall have, in connection with § 9:

Sta. 20,

$a + c = 4.7 + 10.8 = 15.5$, $w = 19.6 + 24.1 = 43.7$.

From the Table of Triangular Prismoids,

| | | |
|---|---|---|
| Under height 15, right of width 43, | | 597 |
| Left of width 44, correction for 0.5, | | 20 |
| Under height 15, correction for 0.7, | | 10 |
| | | 627 |
| Arguments, $a = 4.7$ and $b = 14$ (grade prism), | —61 | 566 |
| Sta. 21, | | |
| $a + c' = 4.7 + 24.2 = 28.9$, $w' = 23.7 + 55.9 = 79.6$, | 2131 | |
| $a = 4.7$, $b = 14$, | —61 | 2070 |
| Total in yards, | | 2636 |
| From above, for sta. 21, | | 2070 |
| Sta. 21 + 20, | | |
| $a + c' = 4.7 + 46.7 = 51.4$, $w' = 37.0 + 82.9 = 119.9$, | 5712 | |
| $a = 4.7$, $b = 14$ (grade prism), | —61 | 5651 |
| | 7721 | |
| Total in yards | 7721 × .20 = | 1544 |
| Grand total, | | 4180 |

11. **Example, Five-level Ground.**—

| Sta. | Center. | Left. | | Right. | |
|---|---|---|---|---|---|
| 46 | 10.8, | $\frac{11.4}{7}$ | $\frac{12.1}{25.1}$, | $\frac{9.9}{7}$ | $\frac{8.6}{19.9}$ |
| 47 | 6.4, | $\frac{6.8}{7}$ | $\frac{7.2}{17.8}$, | $\frac{5.7}{7}$ | $\frac{5.0}{14.5}$ |

* The numerator is the height above or below grade at the point and the denominator is its distance from the center.

† The side slope $s$ is here assumed to be one and one-half horizontal to one vertical, so that

$$a = \frac{b}{2} \div s = \frac{14}{2} \div \frac{1\frac{1}{2}}{1} = 4.7.$$

Substituting in formula (7), using the Table for the multiplications,

| | | | | |
|---|---|---|---|---|
| Sta. 46, arguments, | 25.1 | and | 11.4, | 265 |
| " | 19.9 | " | 9.9, | 183 |
| " | 14.0 | " | 10.8, | 140 588 |
| Similarly for Sta. 47, | | | | 272 |
| Total in yards, | | | | 860 |

12. **Example, Irregular Ground.**—

| Sta. | Center. | Left. | | | Right. | |
|---|---|---|---|---|---|---|
| 20 | 10.8, | $\frac{8.4}{19.6}$, | | | $\frac{11.2}{18}$ | $\frac{11.4}{24.1}$ |
| 21 | 24.2, | $\frac{18.6}{16}$ | $\frac{11.1}{23.7}$, | | $\frac{20.4}{42}$ | $\frac{32.6}{55.9}$ |
| 21+20 | 46.7, | $\frac{40.7}{20}$ | $\frac{20.0}{37.0}$, | $\frac{48.1}{20}$ | $\frac{50}{58}$ | $\frac{50.6}{82.9}$ |

$b = 14$, $s = 1.5$ to 1, $a = 4.7$.

Substituting in formula (8), using the Table for the multiplications,

Volume from sta. 20 to sta. 21.

Sta. 20,

$a+t_r = 4.7+11.2 = 15.9$, $d_r = 24.1$; $c-r_r = 10.8-11.4 = -0.6$, $g_r = 18$;
$a+c = 15.5$, $d_l = 19.6$; $a = 4.7$, $b = 14$.

| | | | |
|---|---|---|---|
| Under height 15, right of width 24, | | 333 | |
| Left of width 24, cor. for 0.9, | | 20 | |
| Under height 16, cor. for 0.1, | | 1 | |
| | | 354 | |
| Arguments, —0.6 and 18, | | —10 | |
| " 19.6 and 15.5, | | 281 | |
| " 14 and 4.7 (grade prism), | | —61 | |
| | | | 564 |
| Sta. 21, Arguments, | | | |
| " 20.4+4.7=25.1, and 55.9, | | 1299 | |
| " 24.2—32.6=—8.4, and 42, | | —327 | |
| " 18.6+4.7=23.3, and 23.7, | | 512 | |
| " 24.2—11.1=13.1, and 16, | | 194 | |
| " 14 and 4.7 (grade prism), | | —61 | |
| | | | 1617 |
| Total in yards, | | | 2181 |

Volume from 21 to 21+20.

| | | |
|---|---|---|
| From above for sta. 21, | | 1617 |
| Sta. 21+20, | | |
| 50+4.7=54.7, and 82.9, | 4200 | |
| 48.1—50.6=—2.5, and 58, | —134 | |
| 46.7—50=—3.3, and 20, | —62 | |
| 40.7+4.7=45.4, and 37, | 1556 | |
| 46.7—20=26.7, and 20, | 494 | |
| 14 and 4.7 (grade prism), | —61 | |
| | | 5993 |
| | | 7610 |
| 7610 × .20 = | | 1522 |
| | | 3703 |

Any other method of dividing the sections into triangles can be used if preferred, although it will result in increased labor.

13. **Borrow Pits.**—In borrow pits, ditches or other work, where the cross sections are made up of triangles or trapezoids, take the altitude and base of each triangle, or the sum of the parallel sides, and the perpendicular distance between them for each trapezoid, as arguments, as with the two sections below.

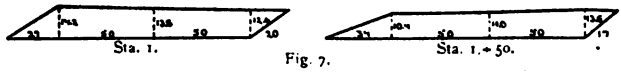



Fig. 7.

| | | |
|---|---|---|
| Sta. 1, 27 and 14.2, . . | 355 | |
| 50 " 28.0, . . | 1296 | |
| 50 " 26.4, . . | 1223 | |
| 20 " 12.6, . . | 233 | |
| | | 3107 |
| Similarly for sta. 1+50, | | 2672 |
| | | 5779 |

$5779 \times .50 = 2890$ yards.

14. **Sidehill Work.**—When a "grade point" occurs in a cross section, one side being in cut, the other in fill, to compute the cutting, put in a break at the grade point and call the cuts on the fill side zero, and the distance to the slope stake $b \div 2$. Then proceed as for irregular sections.

In computing fills the process would be reversed.

EXAMPLE.

| Sta. | Center. | Left. | Right. |
|---|---|---|---|
| 46 | −2.4, $\frac{0.0}{4.3}$ | $\frac{2.2}{12.3}$, | $\frac{-6.4}{16.6}$ |
| 47 | +1.7, $\frac{3.8}{14.7}$, | $\frac{0.0}{2.6}$ | $\frac{-2.9}{11.4}$ |

Roadbed 18 feet in cut, 14 feet in fill, slopes $1\frac{1}{2}$ to 1. Altitude of grade triangle in cut $= 9 \div \frac{1\frac{1}{2}}{1} = 6$, in fill $= 7 \div \frac{1\frac{1}{2}}{1} = 4.7$.

For cutting, the notes would be

| | | | |
|---|---|---|---|
| 46 | 0.0, $\frac{0.0}{4.3}$ | $\frac{2.2}{12.3}$, | $\frac{0.0}{9.0}$ |
| 47 | 1.7, $\frac{3.8}{14.7}$, | $\frac{0.0}{2.6}$ | $\frac{0.0}{9.0}$ |

Giving,

| | | |
|---|---|---|
| Sta. 46, 0.0+6.0= 6, and 12.3, . . | 69 | |
| 0.0−2.2=−2.2, and 4.3, . | −9 | |
| 0.0+6.0= 6, and 9, . . . . | 50 | |
| Grade triangle, 6 and 18, | −100 | |
| | | 10 |
| Sta. 47, similarly, . . . . . | | 60 |
| Total in cu. yards, . . . | | 70 |

Or it may be more convenient to leave out the grade prism, thus:

| | | | | |
|---|---|---|---|---|
| Sta. 46, height=2.2, width= 9 | —4.3= 4.7, giving | . . | 5 | 9 |
| " 47, " =1.7, " | =14.7+2.6=17.3, " | . . | 28 | |
| " =3.8, " | . . . . . 9.0. " | . . | 32 | |
| | | | — | 60 |
| | Total in yards, . . . . . | . . | | 69 |

For filling, the notes would be

| Sta. | Center. | Left. | Right. |
|---|---|---|---|
| 46 | —2.4, . . . | 0.0 / 4.3 . . . 0.0 / 7.0, . . . . . | — 6.4 / 16.6 |
| 47 | . . . 0.0, . . . . . | 0.0 / 7.0, . . . . 0.0 / 2.6 . . . | — 2.9 / 11.4 |

Giving,

| | | | | |
|---|---|---|---|---|
| Sta. 46, | 0.0+4.7=4.7, and | 7, . . | 31 | |
| | 2.4—0.0=2.4, " | 4.3, . . | 9 | |
| | 2.4+4.7=7.1, " | 16.6, . . | 169 | |
| | Grade triangle, 4.7 " | 14, . . | —61 | |
| | | | —— | 88 |
| | Sta. 47, similarly, . . . . . | | | 11 |
| | Total fill in cu. yards, . . . | | | 99 |

15. **End Sections.**—A cross section should be taken wherever either edge of the roadbed in cutting reaches grade. This will require two sections in passing from a cut to a fill, or *vice versa*, while a third is sometimes added where the center line reaches grade. The solid, in cut, between the two sections, is a pyramid with volume equal to area of base into one-third the altitude, or it may be taken under the rule, base into one-half the altitude, and afterwards corrected by the prismoidal formula.

The solid in fill, between the two sections, can usually be taken as having the same altitude, the volume not being required as accurately as for cut; the exact values can be interpolated when necessary.

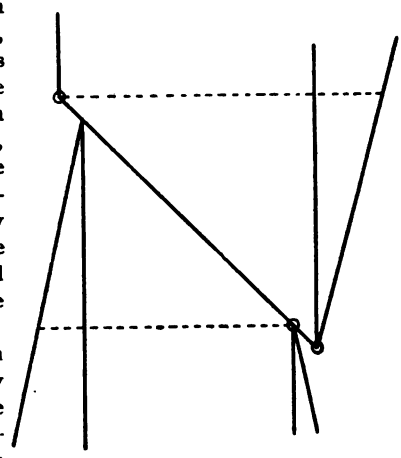


Fig 8.

16. **Correction for Curvature.**—For a solid corresponding to the triangular prismoid, as described in § 5, we have from (5),

$$\text{Correction} = \frac{l}{6R}[(A + 2A_m)e + (2A_m + A')e'] \quad (9)$$

$$= \frac{l}{2R}[Ae + A'e'] \text{ (approx.)} \quad (10)$$

The latter equation is the one in common use, giving, with less labor, sufficient accuracy for earthwork solids.

**Three-level Ground.**—To find $e$, the eccentricity of the center of gravity, we have,

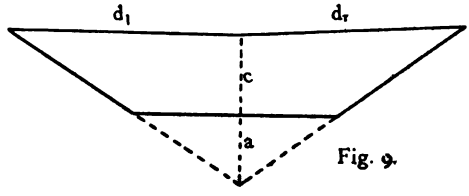


Fig. 9.

For the right side,

$$\text{Area} = (a + c)\frac{d_r}{2}$$

$$\text{Center of gravity from center line} = \frac{d_r}{3}$$

$$(\text{Product})_r = (a + c)\frac{d_r^2}{6}$$

Similarly, for the left side,

$$(\text{Product})_l = -(a + c)\frac{d_l^2}{6}$$

Hence
$$e = \frac{(\text{product})_r + (\text{product})_l}{\text{total area}} = \frac{(a+c)\dfrac{d_r^2 - d_l^2}{6}}{(a+c)\dfrac{d_r + d_l}{2}},$$

Or,
$$e = \frac{d_r - d_l}{3} \quad (11)$$

$$\text{Correction} = \frac{l}{6R}[A(d_r - d_l) + A'(d_r' - d_l')] \quad (12)$$

where $A$ and $A'$ must include the grade triangle.

Or,
$$\text{Correction}_y = \frac{1}{3R}[Q(d_r - d_l) + Q'(d_r' - d_l')] \quad (13)$$

where $Q$ and $Q'$ are the tabular quantities or volumes corresponding to $A$ and $A'$ ($A = \frac{27}{50}Q$) and Correction $_y$ is in cubic yards.

Five-level and irregular ground can usually be taken as three-level, with the same distances to slope stakes, for the purposes of this correction, unless the intermediate heights show a marked tendency to lie above, or below, the lines joining the side heights with the center, when the section can be plotted and an equalizing line drawn, or in extreme cases each triangular prismoid can be taken separately by (10).

**Sidehill Ground**, neglecting all breaks between slope stakes. The center of gravity will be on the line joining the center of the base with the vertex, at one-third its length from the base.

The distance from the lower end of this line to the center, Fig. 10,

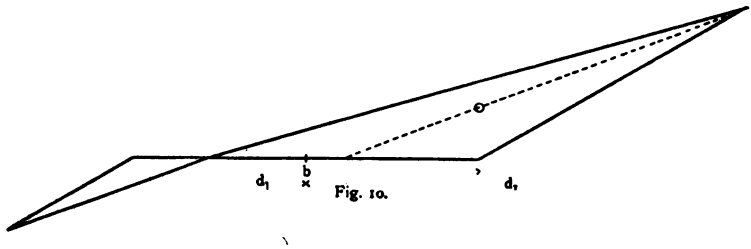


Fig. 10.

$$=\frac{b}{2}-\left(\frac{b}{2}+d_1\right)\frac{1}{2}=\frac{b}{4}-\frac{d_1}{2}$$

Distance from the upper end $=d_r$.

Hence $$e=\tfrac{2}{3}\left(\frac{b}{4}-\frac{d_1}{2}\right)+\tfrac{1}{3}d_r=\tfrac{1}{3}\left(\frac{b}{2}-d_1+d_r\right) \qquad (14)$$

where $d_1$ will be positive if the grade point is on the same side of the center as the slope stake.

Substituting in (10),

$$\text{Correction}=\frac{l}{6R}\left[A\left(\frac{b}{2}-d_1+d_r\right)+A'\left(\frac{b}{2}-d_1'+d_r'\right)\right] \qquad (15)$$

$$\text{Correction}_y=\frac{1}{3R}\left[Q\left(\frac{b}{2}-d_1+d_r\right)+Q'\left(\frac{b}{2}-d_1'+d_r'\right)\right] \qquad (16)$$

17. **Example, Correction for Curvature.**—In the example of § 12, let the center line be on a 7° curve to the right, $R=5730\div 7=819$, and let the intermediate breaks be omitted in finding the correction for curvature.

Volume from sta. 2 › to sta. 21.

$Q$, including the grade triangle, $=625$; $Q'=1678$; $d_1=19.6$; $d_r=24.1$; $d_1'=23.7$; $d_r'=55.9$.

Substituting in (13),

$$\text{Correction}=\frac{1}{3\times 819}[625(24.1-19.6)+1678(55.9-23.7)]= \quad 23$$

Volume from sta. 21 to sta 21 + 20,

$$\text{Correction}=\frac{1}{3\times 819}[1678(55.9-23.7)+6054(82.9-37.0)]=135$$

$$.2\times 135 = \quad 27$$

Total in cu. yards = —50

The correction is negative, the center of gravity and the center of the curve lying on the same side of the center line.

In the example of § 14, let the center line be on a 7° curve to the right.

Volume from sta. 46 to sta. 47.

Substituting in (16),

$$\text{Correction}=\frac{1}{3\times 819}[10(9-12.3-4.3)+60(9-14.7+2.6)]=0$$

This correction would be positive, the center of gravity and the center of the curve being on opposite sides of the center line.

# Prismoidal Correction in Cubic Yards.

18. **Three-level Ground.**—The prismoidal correction to be applied to the volume of a triangular prismoid found by averaging end areas in order to obtain the true volume, has been found to be by (2),

$$\text{Correction} = (c - c')(d' - d)\frac{l}{12}$$

where $c$ and $d$ are the altitude and base of the triangle at the first end, and $c'$ and $d'$ those at the second end.

For three-level ground, per station in cubic yards, this would reduce to

$$\text{Pris. correction} = (c - c')(w' - w)\frac{50}{3 \times 54} \qquad (17)$$

where, as in Fig. 4 and eq. (6), $c$ and $c'$ are the center heights and $w$ and $w'$ are the total widths.

This correction is to be added to the approximate volume found by end areas; it disappears when the center heights, or the widths, are equal, and it can often be neglected without computation when inspection shows one of the factors very small.

19. **Five-level Ground.**—The intermediate heights having been taken over (or under) the edges of the roadbed. In § 7, see Fig. 5, each section was divided into three triangles, one having the distance to the left slope stake, $d_l$, for base, and the height over the left edge of the roadbed, $t_l$, for altitude, the second the corresponding dimensions, $d_r$, $t_r$, on the right, and the third the width of roadbed and the center height. Applying (2), and remembering that since the width of roadbed is the same at both ends, the correction for the third triangle will be zero:

$$\text{Pris. correction} = \left[(t_l - t_l')(d_l' - d_l) + (t_r - t_r')(d_r' - d_r)\right]\frac{50}{3 \times 54} \qquad (18)$$

20. **Irregular Ground, Borrow Pits, etc.**—Since the areas of the sections will be made up of triangles, the correction will be made up of as many terms as there are triangular prismoids in the volume, each term being of the form

$$(c - c')(w' - w)\frac{50}{3 \times 54}.$$

This requires that there should be the same number of breaks at each end of the solid, as already indicated in § 1, in deriving the prismoidal formula and defining the prismoid. If there are not, the distance from the center at which a ridge or hollow runs out at the more regular section should be noted in the field, and the height either noted or computed.

A. M. Wellington* recommends that for the *purposes of the prismoidal correction* irregular ground be assumed to be three-level ground having the center height and total width of the irregular section.

This makes the correction the same as for regular ground, and while for a single volume it may give a result considerably in error, the sign is as likely to be plus as minus, so that there is less tendency to accumulation of error than in the various approximate methods described in §§ 2–4

21. **Table of Prismoidal Corrections.**—The table gives the value of $(c - c')(w' - w)\frac{50}{3\times 54}$, for $c-c'$ (height — height′) and $w' - w$ (width′ —width) as arguments; which is the correction for a length of 100 feet. If the length be not 100, multiply the result by $\frac{1}{100}$ of the length.

To look out the number:—Find the integral part of the height factor in the line of height headings at the top of the page; then move down this column until opposite the integral part of the width factor in the width column, and note the number; then move to the left on this line (or the next below if the tenths of the width factor be greater than 5) and take out the "Correction for tenths of height—height′"; then move to the bottom of the page and under the column first used (or the next to the right if the tenths of the height factor be greater than 5) and take out the "Correction for tenths of width′—width." Take the sum of the three mentally.

If one of the arguments cannot be found in the table, divide it by two, look out the number and multiply by two; if both cannot, divide each by two and multiply by four.

The remarks of § 9 apply to this table the same as to the table of triangular prismoids.

22. **Example, Three-level Ground.**—See § 10.

| Sta. | Center. | Left. | Right. |
|---|---|---|---|
| 20 | 10.8, | $\frac{8.4}{19.6}$, | $\frac{11.4}{24.1}$ |
| 21 | 24.2, | $\frac{11.1}{23.7}$, | $\frac{32.6}{55.9}$ |
| 21+20 | 46.7, | $\frac{20.0}{37.0}$, | $\frac{50.6}{82.9}$ |

Correction for volume from sta. 20 to sta. 21.

$c - c' = 10.8 - 24.2 = -13.4$, $w' - w = 79.6 - 43.7 = +35.9$.

From the Table of Prismoidal Corrections.

| | | | |
|---|---|---|---|
| Under 13, right of argument 35, | | = 140 | |
| Left " | 36, corr. for 0.4 = | 4 | |
| Under | 13, corr. for 0.9 = | 4 | — 148 |

* *Computation from Diagrams of Railway Earthwork.*

Correction for volume from sta. 21 to sta. 21 + 20.

$c - c' = 24\ 2 - 46.7 = -22.5$, $w' - w = 119.9, -79.6 = +40.3$;

22.5 and 40.3 as arguments $= 272 + 6 + 2 = 280$

$-280 \times .20 =$ $-56$

Total correction to the volume found by "End areas" $= -204$

23. **Example, Five-level Ground.**—

| Sta. | Center. | Left. | | Right. | |
|---|---|---|---|---|---|
| 46 | 10.8, | $\frac{11.4}{8}$ | $\frac{12.1}{20.1}$, | $\frac{9.9}{8}$ | $\frac{8.6}{16.6}$ |
| 47 | 6.4, | $\frac{6.8}{8}$ | $\frac{7.2}{15.2}$, | $\frac{5.7}{8}$ | $\frac{5.0}{13.0}$ |

$b = 16$, side slope ratio $s = 1$ to 1. See Fig. 5 and (18).

$t_l - t_l' = 11.4 - 6.8 = +4.6$, $d_l' - d_l = 15.2 - 20.1 = -4.9$.

$t_r - t_r' = 9.9 - 5.7 = +4.2$, $d_r' - d_r = 13.0 - 16.6 = -3.6$.

4.9 and 4.6 as arguments $= 5 + 1 + 1 = -7$

4.2 and 3.6 " $= 4 + 1 = -5$

Correction in yards $= -12$

By the approximate method of § 20: $10.8 - 6.4 = +4.4$; $28.2 - 36.7 = -8.5$.

$+4.4$ and $-8.5 = 10 + 1 + 1 = -12$, = correction in yards.

24. **Example, Irregular Ground.**—See § 12.

| Sta. | Center. | Left. | | | Right. | |
|---|---|---|---|---|---|---|
| 20 | 10.8, | $\frac{8.4}{19.6}$, | | | $\frac{11.2}{18}$ | $\frac{11.4}{24.1}$ |
| 21 | 24.2, | $\frac{18.6}{16}$ | $\frac{11.1}{23.7}$, | | $\frac{20.4}{42}$ | $\frac{32.6}{55.9}$ |
| 21+20 | 46.7, | $\frac{40.7}{20}$ | $\frac{20.0}{37.0}$, | $\frac{48.1}{20}$ | $\frac{50.0}{58}$ | $\frac{50.6}{82.9}$ |

$b = 14$, $s = 1.5$ to 1, $a = 4.7$.

The break 16 feet out at left of sta. 21 runs out 10 feet left, at sta. 20.

The break 20 feet out at right of sta. 21 + 20 runs out at the center at sta. 21.

By interpolation, the height at 10 feet to the left at sta. 20 $= 10.8 - \frac{10}{19.6}[10.8 - 8.4] = 9.6$.

Correction for volume from sta. 20 to sta. 21.

Sta. 20 would be written

| | | | | | |
|---|---|---|---|---|---|
| 10.8, | $\frac{9.6}{10}$ | $\frac{8.4}{19.6}$, | | $\frac{11.2}{18}$ | $\frac{11.4}{24.1}$ |

Changing the factors of § 12 which were used in finding volume, or the areas of the triangles, to correspond with the interpolated break,

Arguments, 19.6−23.7=− 4.1, 23.3−14.3=+ 9.0, corr.=− 11
" 24.1−55.9=−31.8, 25.1−15.9=+ 9.2, " − 90
" 10 −16 =− 6.0, 13.1− 2.4=+10.7, " − 20
" 18 −42 =−24.0, −8.4+0.6=− 7.8, " + 58 −63

Correction for volume from sta. 21 to sta. 21+20.

Sta. 21 would be written

$$24.2,\ \ \frac{18.6}{16}\ \ \frac{11.1}{23.7},\ \ \frac{24.2}{0}\ \ \frac{20.4}{42}\ \ \frac{32.6}{55.9},$$

giving as above,

Arguments, 23.7−37.0=−13.3, 45.4−23.3=+22.1, corr.=− 90
" 55.9−82.9=−27.0, 54.7−25.1=+29.6, " −247
" 16 −20 =− 4.0, 26.7−13.1=+13.6, " − 17
" 42 −58 =−16.0,−2.5+8.4=+ 5.9, " − 29
" 0 −20 =−20.0,−3.3−3.8=− 7.1, " + 44

−339

339×.20= −68

Total correction in yards= −131

By the approximate method of § 20 the result would be that found for the first example, or — 204 cu. yds.

25. **Example, Borrow Pits.**—See example, § 13.

Arguments which were used in finding volume; for sta. 1, 27 and 14.2, 50 and 28.0, 50 and 26.4, 20 and 12.6; for sta. 1 + 50, 34 and 10.4, 50 and 21.4, 50 and 24.6, 17 and 13.6.

The corrections will all disappear except for the first and last product at each station.

Arguments, 27 − 34 = − 7, 10.4 − 14.2 = − 3.8, corr. = + 8
" 20 − 17 = + 3, 13.6 − 12.6 = + 1.0, " = + 1

9

Correction in yards = 9 + .50 = 5.

# Computation---End Areas with Prismoidal Correction.

26. **Three-level Ground.**—

| Sta. | Center. | Left. | Right. |
|---|---|---|---|
| 0 | 7.1 | 6.4 / 14.4 | 8.0 / 16.0 |
| 1 | 9.8 | 7.6 / 15.6 | 12.4 / 20.4 |
| 2 | 12.4 | 12.4 / 20.4 | 10.3 / 18.3 |
| 3 | 8.7 | 9.8 / 17.8 | 8.1 / 16.1 |
| 4 | 10.2 | 11.6 / 19.6 | 9.8 / 17.8 |

Roadbed 16 ft., side slopes 1 to 1.

*COMPUTATION.*

| Sta. | Width. | Height, or h. + a. | Yds. by | End areas | w — w′. | ht′ — ht. | Yards. pris'dl. |
|---|---|---|---|---|---|---|---|
| 0 | 30.4 | 15.1 | 426 | | | | |
| 1 | 36.0 | 17.8 | 594 | 782 | —5.6 | +2.7 | —5 |
| 2 | 38.7 | 20.4 | 731 | 1087 | —2.7 | +2.6 | —2 |
| 3 | 33.9 | 16.7 | 525 | 1018 | +4.8 | —3.7 | —6 |
| 4 | 37.4 | 18.2 | 631 | 918 | —3.5 | +1.5 | —2 |
| | | | 611 | | | | |

Approx. volume = 3805 — 15
Prismo'l cor. = — 15

True volume = 3790

27. **Irregular Ground.**—

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 9 | 6.8 | | | 5.2 / 13.2 | 7.4 / 8 | 3.4 / 11.4 | |
| 10 | 4.9 | | | 9.6 / 17.6 | 4.1 / 9 | 3.6 / 11.6 | |
| 11 | 9.0 | 7.2 / 8 | 5.0 / 12 | 8.4 / 16.4 | 5.2 / 7 | 8.9 / 16.9 | 10,14 / 16 \| * / 12 |
| 12 | 6.8 | | 11.4 / 16 | 12.8 / 20.8 | | 7.1 / 15.1 | |
| 13 | 8.6 | | 7.7 / 12 | 7.4 / 15.4 | | 5.2 / 13.2 | |

*The breaks at the left of 11 run out 10 ft. and 14 ft. respectively to the left of 10, etc.

+47 . . 2.0 . . . . . $\frac{4}{10}$ . . $\frac{5.4}{13.4}$ . . . . . $\frac{0.0}{8.0}$

14 . —5.1 . . . . . $\frac{0.0}{4.0}$ . . $\frac{4.2}{12.2}$ . . . . —$\frac{2.0}{10.0}$ . . . $\frac{|}{8|}$

+20 . —6.0 . . . . . $\frac{0.0}{8.0}$ . . . . —$\frac{4.4}{13.6}$

Roadbed 16 ft., slopes 1 to 1 in cut.
Roadbed 14 ft., slopes 1½ to 1 in fill.

---

**Computation** on the assumption that, *for the purpose of the prismoidal correction only*, the ground is regular.

| Sta. | Width. | Height, or h.+a. | Yds. by End areas | | w—w′. | ht′—ht. | Yards. pris'dl. |
|---|---|---|---|---|---|---|---|
| 9 | 13.2 | 14.8 | 182 | | | | |
| | 11.4 | 15.4 | 163 | | | | |
| | 8 | 3.4 | 25 | | | | |
| 10 | 17.6 | 12.9 | 211 | | | | |
| | 11.6 | 12.1 | 130 | | | | |
| | 9 | 1.3 | 11 | 484 | —4.6 | —1.9 | +2 |
| 11 | 16.4 | 13.0 | 198 | | | | |
| | 12. | —1.2 | —13 | | | | |
| | 8 | +4 | 30 | | | | |
| | 16.9 | 13.2 | 207 | | | | |
| | 7 | +0.1 | 1 | 537 | —4.1 | +4.1 | —5 |
| 12 | 20.8 | 19.4 | 374 | | | | |
| | 16.0 | —6.0 | —89 | | | | |
| | 15.1 | 14.8 | 206 | 676 | —2.6 | —2.2 | +1 |
| 13 | 15.4 | 15.7 | 224 | | | | |
| | 12. | 1.2 | 13 | | | | |
| | 13.2 | 16.6 | 203 | 693 | +7.3 | +1.8 | +4 |
| +47 | 13.4 | 12.0 | 148 | | | | |
| | 10. | —3.4 | —32 | | | | |
| | 8 | 10.0 | 74 | 184 | +7.2 | —6.6 | —7 |
| Pris'l for 14 | 16 | 5.4 | | | | | |
| 14 | 4.0 | 4.2 | 16 | 46 | +12.0 | —1.2 | —3 |
| +20 | 0.0 | 0.0 | 00 | 3 | +4.0 | —4.2 | —1 |

| | | |
|---|---|---|
| Approx. volume = | 2623 | —16 |
| Prismo'l cor. = — | 9 | + 7 |
| Corrected volume = | 2614 | — 9 |

**Computation—*With the true prismoidal correction.***

| Sta. | Width. | Height, or h.+a. | Yds. by | End areas | w — w′. | ht′—ht. | Yards, pris'd. |
|---|---|---|---|---|---|---|---|
| 9 | 13.2 | 14.8 | 182 | | | | |
| | 11.4 | 15.4 | 163 | | | | |
| | 8 | 3.4 | 25 | | | | |
| 10 | 17.6 | 12.9 | 211 | | —4.4 | —1.9 | +2 |
| Pris'l* | 17.6 | 16.6 | | | | | |
| for 11 | 14 | —1.9 | | | | | |
| | 10 | —3.7 | | | | | |
| | 11.6 | 12.1 | 130 | | —0.2 | —3.3 | |
| | 9 | 1.3 | 11 | 484 | —1.0 | —2.1 | +1 |
| 11 | 16.4 | 13.0 | 198 | | +1.2 | —3.6 | —1 |
| | 12 | —1.2 | —13 | | +2.0 | +0.7 | |
| | 8 | +4.0 | 30 | | +2.0 | +7.7 | +4 |
| | 16.9 | 13.2 | 207 | | —5.3 | +1.1 | —2 |
| | 7 | +0.1 | 1 | 537 | +2.0 | —1.2 | —1 |
| 12 | 20.8 | 19.4 | 374 | | —4.4 | +6.4 | —8 |
| | 16 | —6.0 | —89 | | | | |
| Pris'l* | 16 | —1.4 | —119 | | —4.0 | —0.2 | |
| for 11 | 16 | —4.6 | | | —8.0 | —8.6 | +21 |
| | 15.1 | 14.8 | 206 | | | | |
| Pris'l* | 15.1 | 15.0 | | | +1.8 | +1.8 | +1 |
| for 11 | 12 | —0.3 | | 676 | —5.0 | —0.4 | +1 |
| 13 | 15.4 | 15.7 | 224 | | +5.4 | —3.7 | —6 |
| | 12 | 1.2 | 13 | | +4.0 | +7.2 | +9 |
| | 13.2 | 16.6 | 203 | 693 | +1.9 | +1.8 | +1 |
| +47 | 13.4 | 12.0 | 148 | | +2.0 | —3.7 | —1 |
| | 10 | —3.4 | —32 | | +2.0 | —4.6 | —1 |
| | 8 | 10.0 | 74 | 184 | +5.2 | —6.6 | —5 |
| 14 | 12.2 | 8.0 | 90 | | +1.2 | —4.0 | —1 |
| | 4 | —4 2 | —16 | | +6.0 | —0.8 | —1 |
| | 8 | 8.0 | 59 | 45 | 0.0 | —2.0 | |
| +20 | 8 | 8.0 | | | +4.2 | 0.0 | |
| Pris'l* | 8 | 0.0 | | | —4.0 | +4.2 | —1 |
| for 14 | 8 | 8.0 | | 3 | 0.0 | 0.0 | |

| | | |
|---|---|---|
| Approx. volume | + 2622 | + 40 |
| Prism'l. Cor. | = + 12 | — 28 |
| True volume | = 2634 | |

28. **Rules for Cross Sectioning.**—In deriving the prismoidal formula, the ground surface of each prismoid was assumed to be a hyperbolic paraboloid. Hence if the prismoidal formula, or its equivalent, is to be used :

* These can usually be avoided in practice by placing the same number of breaks in adjacent sections as already indicated in § 20.

Place cross sections at the regular stations (usually 100 feet apart), treating the ground as three-level if the surface is very regular; five-level if at all broken, as the increased labor in field and office is slight; and irregular if more broken. The object being to obtain points enough in each cross section so that *straight lines joining them will lie in the surface, or will equalize the surface*, and to adopt the method which will secure this at most of the sections without extra breaks, even if it gives more points than are necessary at some of the more regular stations.

An occasional extra break can often best be treated by itself, as adding or subtracting a computed amount to or from the regular quantity which would be obtained without it.

It should also be noted that the formula requires the same number of sides or points in adjacent cross sections (dividing the solid into triangular prismoids), requiring that when a ridge or hollow runs out its vanishing point in the more regular section be taken and the section be made up with the break for the solid on one side and without it for the solid on the other side of the section. The height of this vanishing point can be computed, but it is usually better to measure it in the field.

Intermediate cross sections should be added whenever straight lines joining corresponding points of the regular sections will not lie in the surface or equalize the surface, and enough should be added to fulfill this condition. When the center line is curved, the lines joining corresponding points of adjacent cross sections should be estimated at the same curvature in judging of their coincidence with the ground surface.

A cross section should also be placed wherever a grade point occurs on either edge of the roadbed (usually limited to the edges in cutting) and one is often placed where a grade point occurs on the center line. In light work and where the transverse slope is small, a section is sometimes taken where the center line comes to grade and the other two sections omitted. See § 15.

The plus stations are preferably placed at 50 feet, at multiples of 10, or at whole feet (except grade points) from the last full station, for convenience of computing grades in the field and quantities in the office. Breaks on a cross section should be put at multiples of 10, or at whole feet, from the center, when possible without a sacrifice of accuracy.

When the method by averaging end areas is used, without the prismoidal correction, additional sections should be taken whenever the change in transverse slope or in area between adjacent sections is great. The reason for this can be seen by referring to (2); halving the distance between sections will halve both factors $(c - c')$ and $(w' - w)$, or quarter the product, so that when the two half length solids are added together the correction or error will be reduced one-half. The error due to averaging end areas can thus be made as small as desirable, but the method if extended far would soon involve more extra labor than to apply the prismoidal correction.

The same remarks will apply to the method by middle areas.

# TABLE

— OF —

# Triangular Prismoids for Railway Earthwork

IN CUBIC YARDS,

**BY AVERAGING END AREAS.**

(See Prismoidal Correction.)

Correction for tenths of height.

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | WIDTH. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 9 |
| | | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 4 | 6 | 7 | 9 | 11 | 13 | 15 | 17 | 19 |
| | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 6 | 8 | 11 | 14 | 17 | 19 | 22 | 25 | 28 |
| | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 7 | 11 | 15 | 19 | 22 | 26 | 30 | 33 | 37 |
| | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 | 9 | 14 | 19 | 23 | 28 | 32 | 37 | 42 | 46 |
| 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 6 | 6 | 11 | 17 | 22 | 28 | 33 | 39 | 44 | 50 | 56 |
| 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 6 | 7 | 6 | 13 | 19 | 26 | 32 | 39 | 45 | 52 | 58 | 65 |
| 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 8 | 7 | 15 | 22 | 30 | 37 | 44 | 52 | 59 | 67 | 74 |
| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 8 | 17 | 25 | 33 | 42 | 50 | 58 | 67 | 75 | 83 |
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 10 | 9 | 19 | 28 | 37 | 46 | 56 | 65 | 74 | 83 | 93 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 10 | 20 | 31 | 41 | 51 | 61 | 71 | 81 | 92 | 102 |
| 1 | 2 | 3 | 4 | 6 | 7 | 8 | 9 | 10 | 12 | 11 | 22 | 33 | 44 | 56 | 67 | 78 | 89 | 100 | 111 |
| 1 | 2 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 13 | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | 108 | 120 |
| 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 12 | 14 | 13 | 26 | 39 | 52 | 65 | 78 | 91 | 104 | 117 | 130 |
| 1 | 3 | 4 | 6 | 7 | 8 | 10 | 11 | 12 | 15 | 14 | 28 | 42 | 56 | 69 | 83 | 97 | 111 | 125 | 139 |
| 1 | 3 | 4 | 6 | 7 | 9 | 10 | 12 | 13 | 16 | 15 | 30 | 44 | 59 | 74 | 89 | 104 | 119 | 133 | 148 |
| 2 | 3 | 5 | 6 | 8 | 9 | 11 | 13 | 14 | 17 | 16 | 31 | 47 | 63 | 79 | 94 | 110 | 126 | 142 | 157 |
| 2 | 3 | 5 | 7 | 8 | 10 | 12 | 13 | 15 | 18 | 17 | 33 | 50 | 67 | 83 | 100 | 117 | 133 | 150 | 167 |
| 2 | 4 | 5 | 7 | 9 | 11 | 12 | 14 | 16 | 19 | 18 | 35 | 53 | 70 | 88 | 106 | 123 | 141 | 158 | 176 |
| 2 | 4 | 6 | 7 | 9 | 11 | 13 | 15 | 17 | 20 | 19 | 37 | 56 | 74 | 93 | 111 | 130 | 148 | 167 | 185 |
| 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 21 | 19 | 39 | 58 | 78 | 97 | 117 | 136 | 156 | 175 | 194 |
| 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 22 | 20 | 41 | 61 | 81 | 102 | 122 | 143 | 163 | 183 | 204 |
| 2 | 4 | 6 | 9 | 11 | 13 | 15 | 17 | 19 | 23 | 21 | 43 | 64 | 85 | 106 | 128 | 149 | 170 | 192 | 213 |
| 2 | 4 | 7 | 9 | 11 | 13 | 16 | 18 | 20 | 24 | 22 | 44 | 67 | 89 | 111 | 133 | 156 | 178 | 200 | 222 |
| 2 | 5 | 7 | 9 | 12 | 14 | 16 | 19 | 21 | 25 | 23 | 46 | 69 | 93 | 116 | 139 | 162 | 185 | 208 | 231 |
| 2 | 5 | 7 | 10 | 12 | 14 | 17 | 19 | 22 | 26 | 24 | 48 | 72 | 96 | 120 | 144 | 169 | 193 | 217 | 241 |
| 3 | 5 | 8 | 10 | 12 | 15 | 18 | 20 | 23 | 27 | 25 | 50 | 75 | 100 | 125 | 150 | 175 | 200 | 225 | 250 |
| 3 | 5 | 8 | 10 | 13 | 16 | 18 | 21 | 23 | 28 | 26 | 52 | 78 | 104 | 130 | 156 | 181 | 207 | 233 | 259 |
| 3 | 5 | 8 | 11 | 13 | 16 | 19 | 21 | 24 | 29 | 27 | 54 | 81 | 107 | 134 | 161 | 188 | 215 | 242 | 269 |
| 3 | 6 | 8 | 11 | 14 | 17 | 19 | 22 | 25 | 30 | 28 | 56 | 83 | 111 | 139 | 167 | 194 | 222 | 250 | 278 |
| 3 | 6 | 9 | 11 | 14 | 17 | 20 | 23 | 26 | 31 | 29 | 57 | 86 | 115 | 144 | 172 | 201 | 230 | 258 | 287 |
| 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 32 | 30 | 59 | 89 | 119 | 148 | 178 | 207 | 237 | 267 | 296 |
| 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 28 | 33 | 31 | 61 | 92 | 122 | 153 | 183 | 214 | 244 | 275 | 306 |
| 3 | 6 | 9 | 13 | 16 | 19 | 22 | 25 | 28 | 34 | 31 | 63 | 94 | 126 | 157 | 189 | 220 | 252 | 283 | 315 |
| 3 | 6 | 10 | 13 | 16 | 19 | 23 | 26 | 29 | 35 | 32 | 65 | 97 | 130 | 162 | 194 | 227 | 259 | 292 | 324 |
| 3 | 7 | 10 | 13 | 17 | 20 | 23 | 27 | 30 | 36 | 33 | 67 | 100 | 133 | 167 | 200 | 233 | 267 | 300 | 333 |
| 3 | 7 | 10 | 14 | 17 | 21 | 24 | 27 | 31 | 37 | 34 | 69 | 103 | 137 | 171 | 206 | 240 | 274 | 308 | 343 |
| 4 | 7 | 11 | 14 | 18 | 21 | 25 | 28 | 32 | 38 | 35 | 70 | 106 | 141 | 176 | 211 | 246 | 281 | 317 | 352 |
| 4 | 7 | 11 | 14 | 18 | 22 | 25 | 29 | 33 | 39 | 36 | 72 | 108 | 144 | 181 | 217 | 253 | 289 | 325 | 361 |
| 4 | 7 | 11 | 15 | 19 | 22 | 26 | 30 | 33 | 40 | 37 | 74 | 111 | 148 | 185 | 222 | 259 | 296 | 333 | 370 |
| 4 | 8 | 11 | 15 | 19 | 23 | 27 | 30 | 34 | 41 | 38 | 76 | 114 | 152 | 190 | 228 | 266 | 304 | 342 | 380 |
| 4 | 8 | 12 | 16 | 19 | 23 | 27 | 31 | 35 | 42 | 39 | 78 | 117 | 156 | 194 | 233 | 272 | 311 | 350 | 389 |
| 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 43 | 40 | 80 | 119 | 159 | 199 | 239 | 279 | 319 | 358 | 398 |
| 4 | 8 | 12 | 16 | 20 | 24 | 29 | 33 | 37 | 44 | 41 | 81 | 122 | 163 | 204 | 244 | 285 | 326 | 367 | 407 |
| 4 | 8 | 13 | 17 | 21 | 25 | 29 | 33 | 38 | 45 | 42 | 83 | 125 | 167 | 208 | 250 | 292 | 333 | 375 | 417 |
| 4 | 9 | 13 | 17 | 21 | 26 | 30 | 34 | 38 | 46 | 43 | 85 | 128 | 170 | 213 | 256 | 298 | 341 | 383 | 426 |
| 4 | 9 | 13 | 17 | 22 | 26 | 30 | 35 | 39 | 47 | 44 | 87 | 131 | 174 | 218 | 261 | 305 | 348 | 392 | 435 |
| 4 | 9 | 13 | 18 | 22 | 27 | 31 | 36 | 40 | 48 | 44 | 89 | 133 | 178 | 222 | 267 | 311 | 356 | 400 | 444 |
| 5 | 9 | 14 | 18 | 23 | 27 | 32 | 36 | 41 | 49 | 45 | 91 | 136 | 181 | 227 | 272 | 318 | 363 | 408 | 454 |
| 5 | 9 | 14 | 19 | 23 | 28 | 32 | 37 | 42 | 50 | 46 | 93 | 139 | 185 | 231 | 278 | 324 | 370 | 417 | 463 |
| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

**Correction for tenths of width.**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0.1 | | | | | 1 | 1 | 1 | 1 | 1 |
| 0.2 | | | 1 | 1 | 1 | 1 | 1 | 2 | 2 |
| 0.3 | | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 |
| 0.4 | | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 4 |
| 0.5 | | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 5 |
| 0.6 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 6 |
| 0.7 | 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 6 | 6 |
| 0.8 | 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 7 |
| 0.9 | 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 8 |

Correction for tenths of height.

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | WIDTH. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 9 | 14 | 19 | 24 | 28 | 33 | 38 | 43 | 51 | 47 | 94 | 142 | 189 | 236 | 283 | 331 | 378 | 425 | 472 |
| 5 | 10 | 14 | 19 | 24 | 29 | 34 | 39 | 43 | 52 | 48 | 96 | 144 | 193 | 241 | 289 | 337 | 385 | 433 | 481 |
| 5 | 10 | 15 | 20 | 25 | 29 | 34 | 39 | 44 | 53 | 49 | 98 | 147 | 196 | 245 | 294 | 344 | 393 | 442 | 491 |
| 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 54 | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
| 5 | 10 | 15 | 20 | 25 | 31 | 36 | 41 | 46 | 55 | 51 | 102 | 153 | 204 | 255 | 306 | 356 | 407 | 458 | 509 |
| 5 | 10 | 16 | 21 | 26 | 31 | 36 | 41 | 47 | 56 | 52 | 104 | 156 | 207 | 259 | 311 | 363 | 415 | 467 | 519 |
| 5 | 11 | 16 | 21 | 26 | 32 | 37 | 42 | 48 | 57 | 53 | 106 | 158 | 211 | 264 | 317 | 369 | 422 | 475 | 528 |
| 5 | 11 | 16 | 21 | 27 | 32 | 38 | 43 | 48 | 58 | 54 | 107 | 161 | 215 | 269 | 322 | 376 | 430 | 483 | 537 |
| 5 | 11 | 16 | 22 | 27 | 33 | 38 | 44 | 49 | 59 | 55 | 109 | 164 | 219 | 273 | 328 | 382 | 437 | 492 | 546 |
| 6 | 11 | 17 | 22 | 28 | 33 | 39 | 44 | 50 | 60 | 56 | 111 | 167 | 222 | 278 | 333 | 389 | 444 | 500 | 556 |
| 6 | 11 | 17 | 23 | 28 | 34 | 40 | 45 | 51 | 61 | 56 | 113 | 169 | 226 | 282 | 339 | 395 | 452 | 508 | 565 |
| 6 | 11 | 17 | 23 | 29 | 34 | 40 | 46 | 52 | 62 | 57 | 115 | 172 | 230 | 287 | 344 | 402 | 459 | 517 | 574 |
| 6 | 12 | 18 | 23 | 29 | 35 | 41 | 47 | 53 | 63 | 58 | 117 | 175 | 233 | 292 | 350 | 408 | 467 | 525 | 583 |
| 6 | 12 | 18 | 24 | 30 | 36 | 41 | 47 | 53 | 64 | 59 | 119 | 178 | 237 | 296 | 356 | 415 | 474 | 533 | 593 |
| 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 65 | 60 | 120 | 181 | 241 | 301 | 361 | 421 | 481 | 542 | 602 |
| 6 | 12 | 18 | 24 | 31 | 37 | 43 | 49 | 55 | 66 | 61 | 122 | 183 | 244 | 306 | 367 | 428 | 489 | 550 | 611 |
| 6 | 12 | 19 | 25 | 31 | 37 | 43 | 50 | 56 | 67 | 62 | 124 | 186 | 248 | 310 | 372 | 434 | 496 | 558 | 620 |
| 6 | 13 | 19 | 25 | 31 | 38 | 44 | 50 | 57 | 68 | 63 | 126 | 189 | 252 | 315 | 378 | 441 | 504 | 567 | 630 |
| 6 | 13 | 19 | 26 | 32 | 38 | 45 | 51 | 58 | 69 | 64 | 128 | 192 | 256 | 319 | 383 | 447 | 511 | 575 | 639 |
| 6 | 13 | 19 | 26 | 32 | 39 | 45 | 52 | 58 | 70 | 65 | 130 | 194 | 259 | 324 | 389 | 454 | 519 | 583 | 648 |
| 7 | 13 | 20 | 26 | 33 | 39 | 46 | 53 | 59 | 71 | 66 | 131 | 197 | 263 | 329 | 394 | 460 | 526 | 592 | 657 |
| 7 | 13 | 20 | 27 | 33 | 40 | 47 | 53 | 60 | 72 | 67 | 133 | 200 | 267 | 333 | 400 | 467 | 533 | 600 | 667 |
| 7 | 14 | 20 | 27 | 34 | 41 | 47 | 54 | 61 | 73 | 68 | 135 | 203 | 270 | 338 | 406 | 473 | 541 | 608 | 676 |
| 7 | 14 | 21 | 27 | 34 | 41 | 48 | 55 | 62 | 74 | 69 | 137 | 206 | 274 | 343 | 411 | 480 | 548 | 617 | 685 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 75 | 69 | 139 | 208 | 278 | 347 | 417 | 486 | 556 | 625 | 694 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 76 | 70 | 141 | 211 | 281 | 352 | 422 | 493 | 563 | 633 | 704 |
| 7 | 14 | 21 | 29 | 36 | 43 | 50 | 57 | 64 | 77 | 71 | 143 | 214 | 285 | 356 | 428 | 499 | 570 | 642 | 713 |
| 7 | 14 | 22 | 29 | 36 | 43 | 51 | 58 | 65 | 78 | 72 | 144 | 217 | 289 | 361 | 433 | 506 | 578 | 650 | 722 |
| 7 | 15 | 22 | 29 | 37 | 44 | 51 | 59 | 66 | 79 | 73 | 146 | 219 | 293 | 366 | 439 | 512 | 585 | 658 | 731 |
| 7 | 15 | 22 | 30 | 37 | 44 | 52 | 59 | 67 | 80 | 74 | 148 | 222 | 296 | 370 | 444 | 519 | 593 | 667 | 741 |
| 8 | 15 | 23 | 30 | 37 | 45 | 53 | 60 | 68 | 81 | 75 | 150 | 225 | 300 | 375 | 450 | 525 | 600 | 675 | 750 |
| 8 | 15 | 23 | 30 | 38 | 46 | 53 | 61 | 68 | 82 | 76 | 152 | 228 | 304 | 380 | 456 | 531 | 607 | 683 | 759 |
| 8 | 15 | 23 | 31 | 38 | 46 | 54 | 61 | 69 | 83 | 77 | 154 | 231 | 307 | 384 | 461 | 538 | 615 | 692 | 769 |
| 8 | 16 | 23 | 31 | 39 | 47 | 54 | 62 | 70 | 84 | 78 | 156 | 233 | 311 | 389 | 467 | 544 | 622 | 700 | 778 |
| 8 | 16 | 24 | 31 | 39 | 47 | 55 | 63 | 71 | 85 | 79 | 157 | 236 | 315 | 394 | 472 | 551 | 630 | 708 | 787 |
| 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 86 | 80 | 159 | 239 | 319 | 398 | 478 | 557 | 637 | 717 | 796 |
| 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 73 | 87 | 81 | 161 | 242 | 322 | 403 | 483 | 564 | 644 | 725 | 806 |
| 8 | 16 | 24 | 33 | 41 | 49 | 57 | 65 | 73 | 88 | 81 | 163 | 244 | 326 | 407 | 489 | 570 | 652 | 733 | 815 |
| 8 | 16 | 25 | 33 | 41 | 49 | 58 | 66 | 74 | 89 | 82 | 165 | 247 | 330 | 412 | 494 | 577 | 659 | 742 | 824 |
| 8 | 17 | 25 | 33 | 42 | 50 | 58 | 67 | 75 | 90 | 83 | 167 | 250 | 333 | 417 | 500 | 583 | 667 | 750 | 833 |
| 8 | 17 | 25 | 34 | 42 | 51 | 59 | 67 | 76 | 91 | 84 | 169 | 253 | 337 | 421 | 506 | 590 | 674 | 758 | 843 |
| 9 | 17 | 26 | 34 | 43 | 51 | 60 | 68 | 77 | 92 | 85 | 170 | 256 | 341 | 426 | 511 | 596 | 681 | 767 | 852 |
| 9 | 17 | 26 | 34 | 43 | 52 | 60 | 69 | 78 | 93 | 86 | 172 | 258 | 344 | 431 | 517 | 603 | 689 | 775 | 861 |
| 9 | 17 | 26 | 35 | 44 | 52 | 61 | 70 | 78 | 94 | 87 | 174 | 261 | 348 | 435 | 522 | 609 | 696 | 783 | 870 |
| 9 | 18 | 26 | 35 | 44 | 53 | 62 | 70 | 79 | 95 | 88 | 176 | 264 | 352 | 440 | 528 | 616 | 704 | 792 | 880 |
| 9 | 18 | 27 | 36 | 44 | 53 | 62 | 71 | 80 | 96 | 89 | 178 | 267 | 356 | 444 | 533 | 622 | 711 | 800 | 889 |
| 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 97 | 90 | 180 | 269 | 359 | 449 | 539 | 629 | 719 | 808 | 898 |
| 9 | 18 | 27 | 36 | 45 | 54 | 64 | 73 | 82 | 98 | 91 | 181 | 272 | 363 | 454 | 544 | 635 | 726 | 817 | 907 |
| 9 | 18 | 28 | 37 | 46 | 55 | 64 | 73 | 83 | 99 | 92 | 183 | 275 | 367 | 458 | 550 | 642 | 733 | 825 | 917 |
| 9 | 19 | 28 | 37 | 46 | 56 | 65 | 74 | 83 | 100 | 93 | 185 | 278 | 370 | 463 | 556 | 648 | 741 | 833 | 926 |
| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Correction for tenths of width.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0.1 | | | | | | 1 | 1 | 1 | 1 |
| 0.2 | | | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| 0.3 | | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 |
| 0.4 | | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 |
| 0.5 | | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 |
| 0.6 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 |
| 0.7 | 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 6 |
| 0.8 | 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 |
| 0.9 | 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 |

Correction for tenths of height.

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | WIDTH. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1 | 1 | 1 | 1 | 1 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| | | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 20 | 22 | 24 | 26 | 28 | 30 | 31 | 33 | 35 | 37 |
| | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 31 | 33 | 36 | 39 | 42 | 44 | 47 | 50 | 53 | 56 |
| | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 4 | 41 | 44 | 48 | 52 | 56 | 59 | 63 | 67 | 70 | 74 |
| | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 51 | 56 | 60 | 65 | 69 | 74 | 79 | 83 | 88 | 93 |
| 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 6 | 61 | 67 | 72 | 78 | 83 | 89 | 94 | 100 | 106 | 111 |
| 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 6 | 7 | 71 | 78 | 84 | 91 | 97 | 104 | 110 | 117 | 123 | 130 |
| 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 8 | 81 | 89 | 96 | 104 | 111 | 119 | 126 | 133 | 141 | 148 |
| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 92 | 100 | 108 | 117 | 125 | 133 | 142 | 150 | 158 | 167 |
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 10 | 102 | 111 | 120 | 130 | 139 | 148 | 157 | 167 | 176 | 185 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 112 | 122 | 132 | 143 | 153 | 163 | 173 | 183 | 194 | 204 |
| 1 | 2 | 3 | 4 | 6 | 7 | 8 | 9 | 10 | 12 | 122 | 133 | 144 | 156 | 167 | 178 | 189 | 200 | 211 | 222 |
| 1 | 2 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 13 | 132 | 144 | 156 | 169 | 181 | 193 | 205 | 217 | 229 | 241 |
| 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 12 | 14 | 143 | 156 | 169 | 181 | 194 | 207 | 220 | 233 | 246 | 259 |
| 1 | 3 | 4 | 6 | 7 | 8 | 10 | 11 | 12 | 15 | 153 | 167 | 181 | 194 | 208 | 222 | 236 | 250 | 264 | 278 |
| 1 | 3 | 4 | 6 | 7 | 9 | 10 | 12 | 13 | 16 | 163 | 178 | 193 | 207 | 222 | 237 | 252 | 267 | 281 | 296 |
| 2 | 3 | 5 | 6 | 8 | 9 | 11 | 13 | 14 | 17 | 173 | 189 | 205 | 220 | 236 | 252 | 268 | 283 | 299 | 315 |
| 2 | 3 | 5 | 7 | 8 | 10 | 12 | 13 | 15 | 18 | 183 | 200 | 217 | 233 | 250 | 267 | 283 | 300 | 317 | 333 |
| 2 | 4 | 5 | 7 | 9 | 11 | 12 | 14 | 16 | 19 | 194 | 211 | 229 | 246 | 264 | 281 | 299 | 317 | 334 | 352 |
| 2 | 4 | 6 | 7 | 9 | 11 | 13 | 15 | 17 | 20 | 204 | 222 | 241 | 259 | 278 | 296 | 315 | 333 | 352 | 370 |
| 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 21 | 214 | 233 | 253 | 272 | 292 | 311 | 331 | 350 | 369 | 389 |
| 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 22 | 224 | 244 | 265 | 285 | 306 | 326 | 346 | 367 | 387 | 407 |
| 2 | 4 | 6 | 9 | 11 | 13 | 15 | 17 | 19 | 23 | 234 | 256 | 277 | 298 | 319 | 341 | 362 | 383 | 405 | 426 |
| 2 | 4 | 7 | 9 | 11 | 13 | 16 | 18 | 20 | 24 | 244 | 267 | 289 | 311 | 333 | 356 | 378 | 400 | 422 | 444 |
| 2 | 5 | 7 | 9 | 12 | 14 | 16 | 19 | 21 | 25 | 255 | 278 | 301 | 324 | 347 | 370 | 394 | 417 | 440 | 463 |
| 2 | 5 | 7 | 10 | 12 | 14 | 17 | 19 | 22 | 26 | 265 | 289 | 313 | 337 | 361 | 385 | 409 | 433 | 457 | 481 |
| 3 | 5 | 8 | 10 | 12 | 15 | 18 | 20 | 23 | 27 | 275 | 300 | 325 | 350 | 375 | 400 | 425 | 450 | 475 | 500 |
| 3 | 5 | 8 | 10 | 13 | 16 | 18 | 21 | 23 | 28 | 285 | 311 | 337 | 363 | 389 | 415 | 441 | 467 | 493 | 519 |
| 3 | 5 | 8 | 11 | 13 | 16 | 19 | 21 | 24 | 29 | 295 | 322 | 349 | 376 | 403 | 430 | 456 | 483 | 510 | 537 |
| 3 | 6 | 8 | 11 | 14 | 17 | 19 | 22 | 25 | 30 | 306 | 333 | 361 | 389 | 417 | 444 | 472 | 500 | 528 | 556 |
| 3 | 6 | 9 | 11 | 14 | 17 | 20 | 23 | 26 | 31 | 316 | 344 | 373 | 402 | 431 | 459 | 488 | 517 | 545 | 574 |
| 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 32 | 326 | 356 | 385 | 415 | 444 | 474 | 504 | 533 | 563 | 593 |
| 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 28 | 33 | 336 | 367 | 397 | 428 | 458 | 489 | 519 | 550 | 581 | 611 |
| 3 | 6 | 9 | 13 | 16 | 19 | 22 | 25 | 28 | 34 | 346 | 378 | 409 | 441 | 472 | 504 | 535 | 567 | 598 | 630 |
| 3 | 6 | 10 | 13 | 16 | 19 | 23 | 26 | 29 | 35 | 356 | 389 | 421 | 454 | 486 | 519 | 551 | 583 | 616 | 648 |
| 3 | 7 | 10 | 13 | 17 | 20 | 23 | 27 | 30 | 36 | 367 | 400 | 433 | 467 | 500 | 533 | 567 | 600 | 633 | 667 |
| 3 | 7 | 10 | 14 | 17 | 21 | 24 | 27 | 31 | 37 | 377 | 411 | 445 | 480 | 514 | 548 | 582 | 617 | 651 | 685 |
| 4 | 7 | 11 | 14 | 18 | 21 | 25 | 28 | 32 | 38 | 387 | 422 | 457 | 493 | 528 | 563 | 598 | 633 | 669 | 704 |
| 4 | 7 | 11 | 14 | 18 | 22 | 25 | 29 | 33 | 39 | 397 | 433 | 469 | 506 | 542 | 578 | 614 | 650 | 686 | 722 |
| 4 | 7 | 11 | 15 | 19 | 22 | 26 | 30 | 33 | 40 | 407 | 444 | 481 | 519 | 556 | 593 | 630 | 667 | 704 | 741 |
| 4 | 8 | 11 | 15 | 19 | 23 | 27 | 30 | 34 | 41 | 418 | 456 | 494 | 531 | 569 | 607 | 645 | 683 | 721 | 759 |
| 4 | 8 | 12 | 16 | 19 | 23 | 27 | 31 | 35 | 42 | 428 | 467 | 506 | 544 | 583 | 622 | 661 | 700 | 739 | 778 |
| 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 43 | 438 | 478 | 518 | 557 | 597 | 637 | 677 | 717 | 756 | 796 |
| 4 | 8 | 12 | 16 | 20 | 24 | 29 | 33 | 37 | 44 | 448 | 489 | 530 | 570 | 611 | 652 | 693 | 733 | 774 | 815 |
| 4 | 8 | 13 | 17 | 21 | 25 | 29 | 33 | 38 | 45 | 458 | 500 | 542 | 583 | 625 | 667 | 708 | 750 | 792 | 833 |
| 4 | 9 | 13 | 17 | 21 | 26 | 30 | 34 | 38 | 46 | 469 | 511 | 554 | 596 | 639 | 681 | 724 | 767 | 809 | 852 |
| 4 | 9 | 13 | 17 | 22 | 26 | 30 | 35 | 39 | 47 | 479 | 522 | 566 | 609 | 653 | 696 | 740 | 783 | 827 | 870 |
| 4 | 9 | 13 | 18 | 22 | 27 | 31 | 36 | 40 | 48 | 489 | 533 | 578 | 622 | 667 | 711 | 756 | 800 | 844 | 889 |
| 5 | 9 | 14 | 18 | 23 | 27 | 32 | 36 | 41 | 49 | 499 | 544 | 590 | 635 | 681 | 726 | 771 | 817 | 862 | 907 |
| 5 | 9 | 14 | 19 | 23 | 28 | 32 | 37 | 42 | 50 | 509 | 556 | 602 | 648 | 694 | 741 | 787 | 833 | 880 | 926 |

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Correction for tenths of width. | | | | | | | | | 0.1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 |
| | | | | | | | | | 0.2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| | | | | | | | | | 0.3 | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 6 |
| | | | | | | | | | 0.4 | 4 | 4 | 5 | 5 | 6 | 6 | 6 | 7 | 7 | 7 |
| | | | | | | | | | 0.5 | 5 | 6 | 6 | 6 | 7 | 7 | 8 | 8 | 9 | 9 |
| | | | | | | | | | 0.6 | 6 | 7 | 7 | 8 | 8 | 9 | 9 | 10 | 11 | 11 |
| | | | | | | | | | 0.7 | 7 | 8 | 8 | 9 | 10 | 10 | 11 | 12 | 12 | 13 |
| | | | | | | | | | 0.8 | 8 | 9 | 10 | 10 | 11 | 12 | 13 | 13 | 14 | 15 |
| | | | | | | | | | 0.9 | 9 | 10 | 11 | 12 | 12 | 13 | 14 | 15 | 16 | 17 |

Correction for tenths of height.

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | WIDTH. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 9 | 14 | 19 | 24 | 28 | 33 | 38 | 43 | 51 | 519 | 567 | 614 | 661 | 708 | 756 | 803 | 850 | 897 | 944 |
| 5 | 10 | 14 | 19 | 24 | 29 | 34 | 39 | 43 | 52 | 530 | 578 | 626 | 674 | 722 | 770 | 819 | 867 | 915 | 963 |
| 5 | 10 | 15 | 20 | 25 | 29 | 34 | 39 | 44 | 53 | 540 | 589 | 638 | 687 | 736 | 785 | 834 | 883 | 932 | 981 |
| 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 54 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | 1000 |
| 5 | 10 | 15 | 20 | 25 | 31 | 36 | 41 | 46 | 55 | 560 | 611 | 662 | 713 | 764 | 815 | 866 | 917 | 968 | 1019 |
| 5 | 10 | 16 | 21 | 26 | 31 | 36 | 41 | 47 | 56 | 570 | 622 | 674 | 726 | 778 | 830 | 881 | 933 | 985 | 1037 |
| 5 | 11 | 16 | 21 | 26 | 32 | 37 | 42 | 48 | 57 | 581 | 633 | 686 | 739 | 792 | 844 | 897 | 950 | 1003 | 1056 |
| 5 | 11 | 16 | 21 | 27 | 32 | 38 | 43 | 48 | 58 | 591 | 644 | 698 | 752 | 806 | 859 | 913 | 967 | 1020 | 1074 |
| 5 | 11 | 16 | 22 | 27 | 33 | 38 | 44 | 49 | 59 | 601 | 656 | 710 | 765 | 819 | 874 | 929 | 983 | 1038 | 1093 |
| 6 | 11 | 17 | 22 | 28 | 33 | 39 | 44 | 50 | 60 | 611 | 667 | 722 | 778 | 833 | 889 | 944 | 1000 | 1056 | 1111 |
| 6 | 11 | 17 | 23 | 28 | 34 | 40 | 45 | 51 | 61 | 621 | 678 | 734 | 791 | 847 | 904 | 960 | 1017 | 1073 | 1130 |
| 6 | 11 | 17 | 23 | 29 | 34 | 40 | 46 | 52 | 62 | 631 | 689 | 746 | 804 | 861 | 919 | 976 | 1033 | 1091 | 1148 |
| 6 | 12 | 18 | 23 | 29 | 35 | 41 | 47 | 53 | 63 | 642 | 700 | 758 | 817 | 875 | 933 | 992 | 1050 | 1108 | 1167 |
| 6 | 12 | 18 | 24 | 30 | 36 | 41 | 47 | 53 | 64 | 652 | 711 | 770 | 830 | 889 | 948 | 1007 | 1067 | 1126 | 1185 |
| 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 65 | 662 | 722 | 782 | 843 | 903 | 963 | 1023 | 1083 | 1144 | 1204 |
| 6 | 12 | 18 | 24 | 31 | 37 | 43 | 49 | 55 | 66 | 672 | 733 | 794 | 856 | 917 | 978 | 1039 | 1100 | 1161 | 1222 |
| 6 | 12 | 19 | 25 | 31 | 37 | 43 | 50 | 56 | 67 | 682 | 744 | 806 | 869 | 931 | 993 | 1055 | 1117 | 1179 | 1241 |
| 6 | 13 | 19 | 25 | 31 | 38 | 44 | 50 | 57 | 68 | 693 | 756 | 819 | 881 | 944 | 1007 | 1070 | 1133 | 1196 | 1259 |
| 6 | 13 | 19 | 26 | 32 | 38 | 45 | 51 | 58 | 69 | 703 | 767 | 831 | 894 | 958 | 1022 | 1086 | 1150 | 1214 | 1278 |
| 6 | 13 | 19 | 26 | 32 | 39 | 45 | 52 | 58 | 70 | 713 | 778 | 843 | 907 | 972 | 1037 | 1102 | 1167 | 1231 | 1296 |
| 7 | 13 | 20 | 26 | 33 | 39 | 46 | 53 | 59 | 71 | 723 | 789 | 855 | 920 | 986 | 1052 | 1118 | 1183 | 1249 | 1315 |
| 7 | 13 | 20 | 27 | 33 | 40 | 47 | 53 | 60 | 72 | 733 | 800 | 867 | 933 | 1000 | 1067 | 1133 | 1200 | 1267 | 1333 |
| 7 | 14 | 20 | 27 | 34 | 41 | 47 | 54 | 61 | 73 | 744 | 811 | 879 | 946 | 1014 | 1081 | 1149 | 1217 | 1284 | 1352 |
| 7 | 14 | 21 | 27 | 34 | 41 | 48 | 55 | 62 | 74 | 754 | 822 | 891 | 959 | 1028 | 1096 | 1165 | 1233 | 1302 | 1370 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 75 | 764 | 833 | 903 | 972 | 1042 | 1111 | 1181 | 1250 | 1319 | 1389 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 76 | 774 | 844 | 915 | 985 | 1056 | 1126 | 1196 | 1267 | 1337 | 1407 |
| 7 | 14 | 21 | 29 | 36 | 43 | 50 | 57 | 64 | 77 | 784 | 856 | 927 | 998 | 1069 | 1141 | 1212 | 1283 | 1355 | 1426 |
| 7 | 14 | 22 | 29 | 36 | 43 | 51 | 58 | 65 | 78 | 794 | 867 | 939 | 1011 | 1083 | 1156 | 1228 | 1300 | 1372 | 1444 |
| 7 | 15 | 22 | 29 | 37 | 44 | 51 | 59 | 66 | 79 | 805 | 878 | 951 | 1024 | 1097 | 1170 | 1244 | 1317 | 1390 | 1463 |
| 7 | 15 | 22 | 30 | 37 | 44 | 52 | 59 | 67 | 80 | 815 | 889 | 963 | 1037 | 1111 | 1185 | 1259 | 1333 | 1407 | 1481 |
| 8 | 15 | 23 | 30 | 37 | 45 | 53 | 60 | 68 | 81 | 825 | 900 | 975 | 1050 | 1125 | 1200 | 1275 | 1350 | 1425 | 1500 |
| 8 | 15 | 23 | 30 | 38 | 46 | 53 | 61 | 68 | 82 | 835 | 911 | 987 | 1063 | 1139 | 1215 | 1291 | 1367 | 1443 | 1519 |
| 8 | 15 | 23 | 31 | 38 | 46 | 54 | 61 | 69 | 83 | 845 | 922 | 999 | 1076 | 1153 | 1230 | 1306 | 1383 | 1460 | 1537 |
| 8 | 16 | 23 | 31 | 39 | 47 | 54 | 62 | 70 | 84 | 856 | 933 | 1011 | 1089 | 1167 | 1244 | 1322 | 1400 | 1478 | 1556 |
| 8 | 16 | 24 | 31 | 39 | 47 | 55 | 63 | 71 | 85 | 866 | 944 | 1023 | 1102 | 1181 | 1259 | 1338 | 1417 | 1495 | 1574 |
| 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 86 | 876 | 956 | 1035 | 1115 | 1194 | 1274 | 1354 | 1433 | 1513 | 1593 |
| 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 73 | 87 | 886 | 967 | 1047 | 1128 | 1208 | 1289 | 1369 | 1450 | 1531 | 1611 |
| 8 | 16 | 24 | 33 | 41 | 49 | 57 | 65 | 73 | 88 | 896 | 978 | 1059 | 1141 | 1222 | 1304 | 1385 | 1467 | 1548 | 1630 |
| 8 | 16 | 25 | 33 | 41 | 49 | 58 | 66 | 74 | 89 | 906 | 989 | 1071 | 1154 | 1236 | 1319 | 1401 | 1483 | 1566 | 1648 |
| 8 | 17 | 25 | 33 | 42 | 50 | 58 | 67 | 75 | 90 | 917 | 1000 | 1083 | 1167 | 1250 | 1333 | 1417 | 1500 | 1583 | 1667 |
| 8 | 17 | 25 | 34 | 42 | 51 | 59 | 67 | 76 | 91 | 927 | 1011 | 1095 | 1180 | 1264 | 1348 | 1432 | 1517 | 1601 | 1685 |
| 9 | 17 | 26 | 34 | 43 | 51 | 60 | 68 | 77 | 92 | 937 | 1022 | 1107 | 1193 | 1278 | 1363 | 1448 | 1533 | 1619 | 1704 |
| 9 | 17 | 26 | 34 | 43 | 52 | 60 | 69 | 78 | 93 | 947 | 1033 | 1119 | 1206 | 1292 | 1378 | 1464 | 1550 | 1636 | 1722 |
| 9 | 17 | 26 | 35 | 44 | 52 | 61 | 70 | 78 | 94 | 957 | 1044 | 1131 | 1219 | 1306 | 1393 | 1480 | 1567 | 1654 | 1741 |
| 9 | 18 | 26 | 35 | 44 | 53 | 62 | 70 | 79 | 95 | 968 | 1056 | 1144 | 1231 | 1319 | 1407 | 1495 | 1583 | 1671 | 1759 |
| 9 | 18 | 27 | 36 | 44 | 53 | 62 | 71 | 80 | 96 | 978 | 1067 | 1156 | 1244 | 1333 | 1422 | 1511 | 1600 | 1689 | 1778 |
| 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 97 | 988 | 1078 | 1168 | 1257 | 1347 | 1437 | 1527 | 1617 | 1706 | 1796 |
| 9 | 18 | 27 | 36 | 45 | 54 | 64 | 73 | 82 | 98 | 998 | 1089 | 1180 | 1270 | 1361 | 1452 | 1543 | 1633 | 1724 | 1815 |
| 9 | 18 | 28 | 37 | 46 | 55 | 64 | 73 | 83 | 99 | 1008 | 1100 | 1192 | 1283 | 1375 | 1467 | 1558 | 1650 | 1742 | 1833 |
| 9 | 19 | 28 | 37 | 46 | 56 | 65 | 74 | 83 | 100 | 1019 | 1111 | 1204 | 1296 | 1389 | 1481 | 1574 | 1667 | 1759 | 1852 |
| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |

| Correction for tenths of width. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 |
| 0.2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| 0.3 | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 6 |
| 0.4 | 4 | 4 | 5 | 5 | 6 | 6 | 6 | 7 | 7 | 7 |
| 0.5 | 5 | 6 | 6 | 6 | 7 | 7 | 8 | 8 | 9 | 9 |
| 0.6 | 6 | 7 | 7 | 8 | 8 | 9 | 9 | 10 | 11 | 11 |
| 0.7 | 7 | 8 | 8 | 9 | 10 | 10 | 11 | 12 | 12 | 13 |
| 0.8 | 8 | 9 | 10 | 10 | 11 | 12 | 13 | 13 | 14 | 15 |
| 0.9 | 9 | 10 | 11 | 12 | 12 | 13 | 14 | 15 | 16 | 17 |

Correction for tenths of height.

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | WIDTH. | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1 | 1 | 1 | 1 | 1 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| | | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 39 | 41 | 43 | 44 | 46 | 48 | 50 | 52 | 54 | 56 |
| | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 58 | 61 | 64 | 67 | 69 | 72 | 75 | 78 | 81 | 83 |
| | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 4 | 78 | 81 | 85 | 89 | 93 | 96 | 100 | 104 | 107 | 111 |
| | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 97 | 102 | 106 | 111 | 116 | 120 | 125 | 130 | 134 | 139 |
| 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 6 | 117 | 122 | 128 | 133 | 139 | 144 | 150 | 156 | 161 | 167 |
| 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 6 | 7 | 136 | 143 | 149 | 156 | 162 | 169 | 175 | 181 | 188 | 194 |
| 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 8 | 156 | 163 | 170 | 178 | 185 | 193 | 200 | 207 | 215 | 222 |
| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 175 | 183 | 192 | 200 | 208 | 217 | 225 | 233 | 242 | 250 |
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 10 | 194 | 204 | 213 | 222 | 231 | 241 | 250 | 259 | 269 | 278 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 214 | 224 | 234 | 244 | 255 | 265 | 275 | 285 | 295 | 306 |
| 1 | 2 | 3 | 4 | 6 | 7 | 8 | 9 | 10 | 12 | 233 | 244 | 256 | 267 | 278 | 289 | 300 | 311 | 322 | 333 |
| 1 | 2 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 13 | 253 | 265 | 277 | 289 | 301 | 313 | 325 | 337 | 349 | 361 |
| 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 12 | 14 | 272 | 285 | 298 | 311 | 324 | 337 | 350 | 363 | 376 | 389 |
| 1 | 3 | 4 | 6 | 7 | 8 | 10 | 11 | 12 | 15 | 292 | 306 | 319 | 333 | 347 | 361 | 375 | 389 | 403 | 417 |
| 1 | 3 | 4 | 6 | 7 | 9 | 10 | 12 | 13 | 16 | 311 | 326 | 341 | 356 | 370 | 385 | 400 | 415 | 430 | 444 |
| 2 | 3 | 5 | 6 | 8 | 9 | 11 | 13 | 14 | 17 | 331 | 346 | 362 | 378 | 394 | 409 | 425 | 441 | 456 | 472 |
| 2 | 3 | 5 | 7 | 8 | 10 | 12 | 13 | 15 | 18 | 350 | 367 | 383 | 400 | 417 | 433 | 450 | 467 | 483 | 500 |
| 2 | 4 | 5 | 7 | 9 | 11 | 12 | 14 | 16 | 19 | 369 | 387 | 405 | 422 | 440 | 457 | 475 | 493 | 510 | 528 |
| 2 | 4 | 6 | 7 | 9 | 11 | 13 | 15 | 17 | 20 | 389 | 407 | 426 | 444 | 463 | 481 | 500 | 519 | 537 | 556 |
| 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 21 | 408 | 428 | 447 | 467 | 486 | 506 | 525 | 544 | 564 | 583 |
| 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 22 | 428 | 448 | 469 | 489 | 509 | 530 | 550 | 570 | 591 | 611 |
| 2 | 4 | 6 | 9 | 11 | 13 | 15 | 17 | 19 | 23 | 447 | 469 | 490 | 511 | 532 | 554 | 575 | 596 | 618 | 639 |
| 2 | 4 | 7 | 9 | 11 | 13 | 16 | 18 | 20 | 24 | 467 | 489 | 511 | 533 | 556 | 578 | 600 | 622 | 644 | 667 |
| 2 | 5 | 7 | 9 | 12 | 14 | 16 | 19 | 21 | 25 | 486 | 509 | 532 | 556 | 579 | 602 | 625 | 648 | 671 | 694 |
| 2 | 5 | 7 | 10 | 12 | 14 | 17 | 19 | 22 | 26 | 506 | 530 | 554 | 578 | 602 | 626 | 650 | 674 | 698 | 722 |
| 3 | 5 | 8 | 10 | 12 | 15 | 18 | 20 | 23 | 27 | 525 | 550 | 575 | 600 | 625 | 650 | 675 | 700 | 725 | 750 |
| 3 | 5 | 8 | 10 | 13 | 16 | 18 | 21 | 23 | 28 | 544 | 570 | 596 | 622 | 648 | 674 | 700 | 726 | 752 | 778 |
| 3 | 5 | 8 | 11 | 13 | 16 | 19 | 21 | 24 | 29 | 564 | 591 | 618 | 644 | 671 | 698 | 725 | 752 | 779 | 806 |
| 3 | 6 | 8 | 11 | 14 | 17 | 19 | 22 | 25 | 30 | 583 | 611 | 639 | 667 | 694 | 722 | 750 | 778 | 806 | 833 |
| 3 | 6 | 9 | 11 | 14 | 17 | 20 | 23 | 26 | 31 | 603 | 631 | 660 | 689 | 718 | 746 | 775 | 804 | 832 | 861 |
| 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 32 | 622 | 652 | 681 | 711 | 741 | 770 | 800 | 830 | 859 | 889 |
| 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 28 | 33 | 642 | 672 | 703 | 733 | 764 | 794 | 825 | 856 | 886 | 917 |
| 3 | 6 | 9 | 13 | 16 | 19 | 22 | 25 | 28 | 34 | 661 | 693 | 724 | 756 | 787 | 819 | 850 | 881 | 913 | 944 |
| 3 | 6 | 10 | 13 | 16 | 19 | 23 | 26 | 29 | 35 | 681 | 713 | 745 | 778 | 810 | 843 | 875 | 907 | 940 | 972 |
| 3 | 7 | 10 | 13 | 17 | 20 | 23 | 27 | 30 | 36 | 700 | 733 | 767 | 800 | 833 | 867 | 900 | 933 | 967 | 1000 |
| 3 | 7 | 10 | 14 | 17 | 21 | 24 | 27 | 31 | 37 | 719 | 754 | 788 | 822 | 856 | 891 | 925 | 959 | 994 | 1028 |
| 4 | 7 | 11 | 14 | 18 | 21 | 25 | 28 | 32 | 38 | 739 | 774 | 809 | 844 | 880 | 915 | 950 | 985 | 1020 | 1056 |
| 4 | 7 | 11 | 14 | 18 | 22 | 25 | 29 | 33 | 39 | 758 | 794 | 831 | 867 | 903 | 939 | 975 | 1011 | 1047 | 1083 |
| 4 | 7 | 11 | 15 | 19 | 22 | 26 | 30 | 33 | 40 | 778 | 815 | 852 | 889 | 926 | 963 | 1000 | 1037 | 1074 | 1111 |
| 4 | 8 | 11 | 15 | 19 | 23 | 27 | 30 | 34 | 41 | 797 | 835 | 873 | 911 | 949 | 987 | 1025 | 1063 | 1101 | 1139 |
| 4 | 8 | 12 | 16 | 19 | 23 | 27 | 31 | 35 | 42 | 817 | 856 | 894 | 933 | 972 | 1011 | 1050 | 1089 | 1128 | 1167 |
| 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 43 | 836 | 876 | 916 | 956 | 995 | 1035 | 1075 | 1115 | 1155 | 1194 |
| 4 | 8 | 12 | 16 | 20 | 24 | 29 | 33 | 37 | 44 | 856 | 896 | 937 | 978 | 1019 | 1059 | 1100 | 1141 | 1181 | 1222 |
| 4 | 8 | 13 | 17 | 21 | 25 | 29 | 33 | 38 | 45 | 875 | 917 | 958 | 1000 | 1042 | 1083 | 1125 | 1167 | 1208 | 1250 |
| 4 | 9 | 13 | 17 | 21 | 26 | 30 | 34 | 38 | 46 | 894 | 937 | 980 | 1022 | 1065 | 1107 | 1150 | 1193 | 1235 | 1278 |
| 4 | 9 | 13 | 17 | 22 | 26 | 30 | 35 | 39 | 47 | 914 | 957 | 1001 | 1044 | 1088 | 1131 | 1175 | 1219 | 1262 | 1306 |
| 4 | 9 | 13 | 18 | 22 | 27 | 31 | 36 | 40 | 48 | 933 | 978 | 1022 | 1067 | 1111 | 1156 | 1200 | 1244 | 1289 | 1333 |
| 5 | 9 | 14 | 18 | 23 | 27 | 32 | 36 | 41 | 49 | 953 | 998 | 1044 | 1089 | 1134 | 1180 | 1225 | 1270 | 1316 | 1361 |
| 5 | 9 | 14 | 19 | 23 | 28 | 32 | 37 | 42 | 50 | 972 | 1019 | 1065 | 1111 | 1157 | 1204 | 1250 | 1296 | 1343 | 1389 |
| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |

| Correction for tenths of width. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
| 0.2 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 6 |
| 0.3 | 6 | 6 | 6 | 7 | 7 | 7 | 8 | 8 | 8 | 8 |
| 0.4 | 8 | 8 | 9 | 9 | 9 | 10 | 10 | 10 | 11 | 11 |
| 0.5 | 10 | 10 | 11 | 11 | 12 | 12 | 13 | 13 | 13 | 14 |
| 0.6 | 12 | 12 | 13 | 13 | 14 | 14 | 15 | 16 | 16 | 17 |
| 0.7 | 14 | 14 | 15 | 16 | 16 | 17 | 18 | 18 | 19 | 19 |
| 0.8 | 16 | 16 | 17 | 18 | 19 | 19 | 20 | 21 | 21 | 22 |
| 0.9 | 18 | 18 | 19 | 20 | 21 | 22 | 23 | 23 | 24 | 25 |

Correction for tenths of height.

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | WIDTH. | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 9 | 14 | 19 | 24 | 28 | 33 | 38 | 43 | 51 | 992 | 1039 | 1086 | 1133 | 1181 | 1228 | 1275 | 1322 | 1369 | 1417 |
| 5 | 10 | 14 | 19 | 24 | 29 | 34 | 39 | 43 | 52 | 1011 | 1059 | 1107 | 1156 | 1204 | 1252 | 1300 | 1348 | 1396 | 1444 |
| 5 | 10 | 15 | 20 | 25 | 29 | 34 | 39 | 44 | 53 | 1031 | 1080 | 1129 | 1178 | 1227 | 1276 | 1325 | 1374 | 1423 | 1472 |
| 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 54 | 1050 | 1100 | 1150 | 1200 | 1250 | 1300 | 1350 | 1400 | 1450 | 1500 |
| 5 | 10 | 15 | 20 | 25 | 31 | 36 | 41 | 46 | 55 | 1069 | 1120 | 1171 | 1222 | 1273 | 1324 | 1375 | 1426 | 1477 | 1528 |
| 5 | 10 | 16 | 21 | 26 | 31 | 36 | 41 | 47 | 56 | 1089 | 1141 | 1193 | 1244 | 1296 | 1348 | 1400 | 1452 | 1504 | 1556 |
| 5 | 11 | 16 | 21 | 26 | 32 | 37 | 42 | 48 | 57 | 1108 | 1161 | 1214 | 1267 | 1319 | 1372 | 1425 | 1478 | 1531 | 1583 |
| 5 | 11 | 16 | 21 | 27 | 32 | 38 | 43 | 48 | 58 | 1128 | 1181 | 1235 | 1289 | 1343 | 1396 | 1450 | 1504 | 1557 | 1611 |
| 5 | 11 | 16 | 22 | 27 | 33 | 38 | 44 | 49 | 59 | 1147 | 1202 | 1256 | 1311 | 1366 | 1420 | 1475 | 1530 | 1584 | 1639 |
| 6 | 11 | 17 | 22 | 28 | 33 | 39 | 44 | 50 | 60 | 1167 | 1222 | 1278 | 1333 | 1389 | 1444 | 1500 | 1556 | 1611 | 1667 |
| 6 | 11 | 17 | 23 | 28 | 34 | 40 | 45 | 51 | 61 | 1186 | 1243 | 1299 | 1356 | 1412 | 1469 | 1525 | 1581 | 1638 | 1694 |
| 6 | 11 | 17 | 23 | 29 | 34 | 40 | 46 | 52 | 62 | 1206 | 1263 | 1320 | 1378 | 1435 | 1493 | 1550 | 1607 | 1665 | 1722 |
| 6 | 12 | 18 | 23 | 29 | 35 | 41 | 47 | 53 | 63 | 1225 | 1283 | 1342 | 1400 | 1458 | 1517 | 1575 | 1633 | 1692 | 1750 |
| 6 | 12 | 18 | 24 | 30 | 36 | 41 | 47 | 53 | 64 | 1244 | 1304 | 1363 | 1422 | 1481 | 1541 | 1600 | 1659 | 1719 | 1778 |
| 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 65 | 1264 | 1324 | 1384 | 1444 | 1505 | 1565 | 1625 | 1685 | 1745 | 1806 |
| 6 | 12 | 18 | 24 | 31 | 37 | 43 | 49 | 55 | 66 | 1283 | 1344 | 1406 | 1467 | 1528 | 1589 | 1650 | 1711 | 1772 | 1833 |
| 6 | 12 | 19 | 25 | 31 | 37 | 43 | 50 | 56 | 67 | 1303 | 1365 | 1427 | 1489 | 1551 | 1613 | 1675 | 1737 | 1799 | 1861 |
| 6 | 13 | 19 | 25 | 31 | 38 | 44 | 50 | 57 | 68 | 1322 | 1385 | 1448 | 1511 | 1574 | 1637 | 1700 | 1763 | 1826 | 1889 |
| 6 | 13 | 19 | 26 | 32 | 38 | 45 | 51 | 58 | 69 | 1342 | 1406 | 1469 | 1533 | 1597 | 1661 | 1725 | 1789 | 1853 | 1917 |
| 6 | 13 | 19 | 26 | 32 | 39 | 45 | 52 | 58 | 70 | 1361 | 1426 | 1491 | 1556 | 1620 | 1685 | 1750 | 1815 | 1880 | 1944 |
| 7 | 13 | 20 | 26 | 33 | 39 | 46 | 53 | 59 | 71 | 1381 | 1446 | 1512 | 1578 | 1644 | 1709 | 1775 | 1841 | 1906 | 1972 |
| 7 | 13 | 20 | 27 | 33 | 40 | 47 | 53 | 60 | 72 | 1400 | 1467 | 1533 | 1600 | 1667 | 1733 | 1800 | 1867 | 1933 | 2000 |
| 7 | 14 | 20 | 27 | 34 | 41 | 47 | 54 | 61 | 73 | 1419 | 1487 | 1555 | 1622 | 1690 | 1757 | 1825 | 1893 | 1960 | 2028 |
| 7 | 14 | 21 | 27 | 34 | 41 | 48 | 55 | 62 | 74 | 1439 | 1507 | 1576 | 1644 | 1713 | 1781 | 1850 | 1919 | 1987 | 2056 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 75 | 1458 | 1528 | 1597 | 1667 | 1736 | 1806 | 1875 | 1944 | 2014 | 2083 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 76 | 1478 | 1548 | 1619 | 1689 | 1759 | 1830 | 1900 | 1970 | 2041 | 2111 |
| 7 | 14 | 21 | 29 | 36 | 43 | 50 | 57 | 64 | 77 | 1497 | 1569 | 1640 | 1711 | 1782 | 1854 | 1925 | 1996 | 2068 | 2139 |
| 7 | 14 | 22 | 29 | 36 | 43 | 51 | 58 | 65 | 78 | 1517 | 1589 | 1661 | 1733 | 1806 | 1878 | 1950 | 2022 | 2094 | 2167 |
| 7 | 15 | 22 | 29 | 37 | 44 | 51 | 59 | 66 | 79 | 1536 | 1609 | 1682 | 1756 | 1829 | 1902 | 1975 | 2048 | 2121 | 2194 |
| 7 | 15 | 22 | 30 | 37 | 44 | 52 | 59 | 67 | 80 | 1556 | 1630 | 1704 | 1778 | 1852 | 1926 | 2000 | 2074 | 2148 | 2222 |
| 8 | 15 | 23 | 30 | 37 | 45 | 53 | 60 | 68 | 81 | 1575 | 1650 | 1725 | 1800 | 1875 | 1950 | 2025 | 2100 | 2175 | 2250 |
| 8 | 15 | 23 | 30 | 38 | 46 | 53 | 61 | 68 | 82 | 1594 | 1670 | 1746 | 1822 | 1898 | 1974 | 2050 | 2126 | 2202 | 2278 |
| 8 | 15 | 23 | 31 | 38 | 46 | 54 | 61 | 69 | 83 | 1614 | 1691 | 1768 | 1844 | 1921 | 1998 | 2075 | 2152 | 2229 | 2306 |
| 8 | 16 | 23 | 31 | 39 | 47 | 54 | 62 | 70 | 84 | 1633 | 1711 | 1789 | 1867 | 1944 | 2022 | 2100 | 2178 | 2256 | 2333 |
| 8 | 16 | 24 | 31 | 39 | 47 | 55 | 63 | 71 | 85 | 1653 | 1731 | 1810 | 1889 | 1968 | 2046 | 2125 | 2204 | 2282 | 2361 |
| 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 86 | 1672 | 1752 | 1831 | 1911 | 1991 | 2070 | 2150 | 2230 | 2309 | 2389 |
| 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 73 | 87 | 1692 | 1772 | 1853 | 1933 | 2014 | 2094 | 2175 | 2256 | 2336 | 2417 |
| 8 | 16 | 24 | 33 | 41 | 49 | 57 | 65 | 73 | 88 | 1711 | 1793 | 1874 | 1956 | 2037 | 2119 | 2200 | 2281 | 2363 | 2444 |
| 8 | 16 | 25 | 33 | 41 | 49 | 58 | 66 | 74 | 89 | 1731 | 1813 | 1895 | 1978 | 2060 | 2143 | 2225 | 2307 | 2390 | 2472 |
| 8 | 17 | 25 | 33 | 42 | 50 | 58 | 67 | 75 | 90 | 1750 | 1833 | 1917 | 2000 | 2083 | 2167 | 2250 | 2333 | 2417 | 2500 |
| 8 | 17 | 25 | 34 | 42 | 51 | 59 | 67 | 76 | 91 | 1769 | 1854 | 1938 | 2022 | 2106 | 2191 | 2275 | 2359 | 2444 | 2528 |
| 9 | 17 | 26 | 34 | 43 | 51 | 60 | 68 | 77 | 92 | 1789 | 1874 | 1959 | 2044 | 2130 | 2215 | 2300 | 2385 | 2470 | 2556 |
| 9 | 17 | 26 | 34 | 43 | 52 | 60 | 69 | 78 | 93 | 1808 | 1894 | 1981 | 2067 | 2153 | 2239 | 2325 | 2411 | 2497 | 2583 |
| 9 | 17 | 26 | 35 | 44 | 52 | 61 | 70 | 78 | 94 | 1828 | 1915 | 2002 | 2089 | 2176 | 2263 | 2350 | 2437 | 2524 | 2611 |
| 9 | 18 | 26 | 35 | 44 | 53 | 62 | 70 | 79 | 95 | 1847 | 1935 | 2023 | 2111 | 2199 | 2287 | 2375 | 2463 | 2551 | 2639 |
| 9 | 18 | 27 | 36 | 44 | 53 | 62 | 71 | 80 | 96 | 1867 | 1956 | 2044 | 2133 | 2222 | 2311 | 2400 | 2489 | 2578 | 2667 |
| 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 97 | 1886 | 1976 | 2066 | 2156 | 2245 | 2335 | 2425 | 2515 | 2605 | 2694 |
| 9 | 18 | 27 | 36 | 45 | 54 | 64 | 73 | 82 | 98 | 1906 | 1996 | 2087 | 2178 | 2269 | 2359 | 2450 | 2541 | 2631 | 2722 |
| 9 | 18 | 28 | 37 | 46 | 55 | 64 | 73 | 83 | 99 | 1925 | 2017 | 2108 | 2200 | 2292 | 2383 | 2475 | 2567 | 2658 | 2750 |
| 9 | 19 | 28 | 37 | 46 | 56 | 65 | 74 | 83 | 100 | 1944 | 2037 | 2130 | 2222 | 2315 | 2407 | 2500 | 2593 | 2685 | 2778 |
| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |

| Correction for tenths of width. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
| 0.2 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 6 |
| 0.3 | 6 | 6 | 6 | 7 | 7 | 7 | 8 | 8 | 8 | 8 |
| 0.4 | 8 | 8 | 9 | 9 | 9 | 10 | 10 | 10 | 11 | 11 |
| 0.5 | 10 | 10 | 11 | 11 | 12 | 12 | 12 | 13 | 13 | 14 |
| 0.6 | 12 | 12 | 13 | 13 | 14 | 14 | 15 | 16 | 16 | 17 |
| 0.7 | 14 | 14 | 15 | 16 | 16 | 17 | 18 | 18 | 19 | 19 |
| 0.8 | 16 | 16 | 17 | 18 | 19 | 19 | 20 | 21 | 21 | 22 |
| 0.9 | 18 | 18 | 19 | 20 | 21 | 22 | 23 | 23 | 24 | 25 |

Correction for tenths of height.

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | WIDTH. | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1 | 1 | 1 | 1 | 1 | 29 | 30 | 31 | 31 | 32 | 33 | 34 | 35 | 36 | 37 |
| | | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 57 | 59 | 61 | 63 | 65 | 67 | 69 | 70 | 72 | 74 |
| | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 86 | 89 | 92 | 94 | 97 | 100 | 103 | 106 | 108 | 111 |
| | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 4 | 115 | 119 | 122 | 126 | 130 | 133 | 137 | 141 | 144 | 148 |
| | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 144 | 148 | 153 | 157 | 162 | 167 | 171 | 176 | 181 | 185 |
| 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 6 | 172 | 178 | 183 | 189 | 194 | 200 | 206 | 211 | 217 | 222 |
| 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 6 | 7 | 201 | 207 | 214 | 220 | 227 | 233 | 240 | 246 | 253 | 259 |
| 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 8 | 230 | 237 | 244 | 252 | 259 | 267 | 274 | 281 | 289 | 296 |
| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 258 | 267 | 275 | 283 | 292 | 300 | 308 | 317 | 325 | 333 |
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 10 | 287 | 296 | 306 | 315 | 324 | 333 | 343 | 352 | 361 | 370 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 316 | 326 | 336 | 346 | 356 | 367 | 377 | 387 | 397 | 407 |
| 1 | 2 | 3 | 4 | 6 | 7 | 8 | 9 | 10 | 12 | 344 | 356 | 367 | 378 | 389 | 400 | 411 | 422 | 433 | 444 |
| 1 | 2 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 13 | 373 | 385 | 397 | 409 | 421 | 433 | 445 | 457 | 469 | 481 |
| 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 12 | 14 | 402 | 415 | 428 | 441 | 454 | 467 | 480 | 493 | 506 | 519 |
| 1 | 3 | 4 | 6 | 7 | 8 | 10 | 11 | 12 | 15 | 431 | 444 | 458 | 472 | 486 | 500 | 514 | 528 | 542 | 556 |
| 1 | 3 | 4 | 6 | 7 | 9 | 10 | 12 | 13 | 16 | 459 | 474 | 489 | 504 | 519 | 533 | 548 | 563 | 578 | 593 |
| 2 | 3 | 5 | 6 | 8 | 9 | 11 | 13 | 14 | 17 | 488 | 504 | 519 | 535 | 551 | 567 | 582 | 598 | 614 | 630 |
| 2 | 3 | 5 | 7 | 8 | 10 | 12 | 13 | 15 | 18 | 517 | 533 | 550 | 567 | 583 | 600 | 617 | 633 | 650 | 667 |
| 2 | 4 | 5 | 7 | 9 | 11 | 12 | 14 | 16 | 19 | 545 | 563 | 581 | 598 | 616 | 633 | 651 | 669 | 686 | 704 |
| 2 | 4 | 6 | 7 | 9 | 11 | 13 | 15 | 17 | 20 | 574 | 593 | 611 | 630 | 648 | 667 | 685 | 704 | 722 | 741 |
| 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 21 | 603 | 622 | 642 | 661 | 681 | 700 | 719 | 739 | 758 | 778 |
| 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 22 | 631 | 652 | 672 | 693 | 713 | 733 | 754 | 774 | 794 | 815 |
| 2 | 4 | 6 | 9 | 11 | 13 | 15 | 17 | 19 | 23 | 660 | 681 | 703 | 724 | 745 | 767 | 788 | 809 | 831 | 852 |
| 2 | 4 | 7 | 9 | 11 | 13 | 16 | 18 | 20 | 24 | 689 | 711 | 733 | 756 | 778 | 800 | 822 | 844 | 867 | 889 |
| 2 | 5 | 7 | 9 | 12 | 14 | 16 | 19 | 21 | 25 | 718 | 741 | 764 | 787 | 810 | 833 | 856 | 880 | 903 | 926 |
| 2 | 5 | 7 | 10 | 12 | 14 | 17 | 19 | 22 | 26 | 746 | 770 | 794 | 819 | 843 | 867 | 891 | 915 | 939 | 963 |
| 3 | 5 | 8 | 10 | 12 | 15 | 18 | 20 | 23 | 27 | 775 | 800 | 825 | 850 | 875 | 900 | 925 | 950 | 975 | 1000 |
| 3 | 5 | 8 | 10 | 13 | 16 | 18 | 21 | 23 | 28 | 804 | 830 | 856 | 881 | 907 | 933 | 959 | 985 | 1011 | 1037 |
| 3 | 5 | 8 | 11 | 13 | 16 | 19 | 21 | 24 | 29 | 832 | 859 | 886 | 913 | 940 | 967 | 994 | 1020 | 1047 | 1074 |
| 3 | 6 | 8 | 11 | 14 | 17 | 19 | 22 | 25 | 30 | 861 | 889 | 917 | 944 | 972 | 1000 | 1028 | 1056 | 1083 | 1111 |
| 3 | 6 | 9 | 11 | 14 | 17 | 20 | 23 | 26 | 31 | 890 | 919 | 947 | 976 | 1005 | 1033 | 1062 | 1091 | 1119 | 1148 |
| 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 32 | 919 | 948 | 978 | 1007 | 1037 | 1067 | 1096 | 1126 | 1156 | 1185 |
| 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 28 | 33 | 947 | 978 | 1008 | 1039 | 1069 | 1100 | 1131 | 1161 | 1192 | 1222 |
| 3 | 6 | 9 | 13 | 16 | 19 | 22 | 25 | 28 | 34 | 976 | 1007 | 1039 | 1070 | 1102 | 1133 | 1165 | 1196 | 1228 | 1259 |
| 3 | 6 | 10 | 13 | 16 | 19 | 23 | 26 | 29 | 35 | 1005 | 1037 | 1069 | 1102 | 1134 | 1167 | 1199 | 1231 | 1264 | 1296 |
| 3 | 7 | 10 | 13 | 17 | 20 | 23 | 27 | 30 | 36 | 1033 | 1067 | 1100 | 1133 | 1167 | 1200 | 1233 | 1267 | 1300 | 1333 |
| 3 | 7 | 10 | 14 | 17 | 21 | 24 | 27 | 31 | 37 | 1062 | 1096 | 1131 | 1165 | 1199 | 1233 | 1268 | 1302 | 1336 | 1370 |
| 4 | 7 | 11 | 14 | 18 | 21 | 25 | 28 | 32 | 38 | 1091 | 1126 | 1161 | 1196 | 1231 | 1267 | 1302 | 1337 | 1372 | 1407 |
| 4 | 7 | 11 | 14 | 18 | 22 | 25 | 29 | 33 | 39 | 1119 | 1156 | 1192 | 1228 | 1264 | 1300 | 1336 | 1372 | 1408 | 1444 |
| 4 | 7 | 11 | 15 | 19 | 22 | 26 | 30 | 33 | 40 | 1148 | 1185 | 1222 | 1259 | 1296 | 1333 | 1370 | 1407 | 1444 | 1481 |
| 4 | 8 | 11 | 15 | 19 | 23 | 27 | 30 | 34 | 41 | 1177 | 1215 | 1253 | 1291 | 1329 | 1367 | 1405 | 1443 | 1481 | 1519 |
| 4 | 8 | 12 | 16 | 19 | 23 | 27 | 31 | 35 | 42 | 1206 | 1244 | 1283 | 1322 | 1361 | 1400 | 1439 | 1478 | 1517 | 1556 |
| 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 43 | 1234 | 1274 | 1314 | 1354 | 1394 | 1433 | 1473 | 1513 | 1553 | 1593 |
| 4 | 8 | 12 | 16 | 20 | 24 | 29 | 33 | 37 | 44 | 1263 | 1304 | 1344 | 1385 | 1426 | 1467 | 1507 | 1548 | 1589 | 1630 |
| 4 | 8 | 13 | 17 | 21 | 25 | 29 | 33 | 38 | 45 | 1292 | 1333 | 1375 | 1417 | 1458 | 1500 | 1542 | 1583 | 1625 | 1667 |
| 4 | 9 | 13 | 17 | 21 | 26 | 30 | 34 | 38 | 46 | 1320 | 1363 | 1406 | 1448 | 1491 | 1533 | 1576 | 1619 | 1661 | 1704 |
| 4 | 9 | 13 | 17 | 22 | 26 | 30 | 35 | 39 | 47 | 1349 | 1393 | 1436 | 1480 | 1523 | 1567 | 1610 | 1654 | 1697 | 1741 |
| 4 | 9 | 13 | 18 | 22 | 27 | 31 | 36 | 40 | 48 | 1378 | 1422 | 1467 | 1511 | 1556 | 1600 | 1644 | 1689 | 1733 | 1778 |
| 5 | 9 | 14 | 18 | 23 | 27 | 32 | 36 | 41 | 49 | 1406 | 1452 | 1497 | 1543 | 1588 | 1633 | 1679 | 1724 | 1769 | 1815 |
| 5 | 9 | 14 | 19 | 23 | 28 | 32 | 37 | 42 | 50 | 1435 | 1481 | 1528 | 1574 | 1620 | 1667 | 1713 | 1759 | 1806 | 1852 |
| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Correction for tenths of width. | 0.1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 |
| | 0.2 | 6 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 7 |
| | 0.3 | 9 | 9 | 9 | 9 | 10 | 10 | 10 | 11 | 11 | 11 |
| | 0.4 | 11 | 12 | 12 | 13 | 13 | 13 | 14 | 14 | 14 | 15 |
| | 0.5 | 14 | 15 | 15 | 16 | 16 | 17 | 17 | 18 | 18 | 19 |
| | 0.6 | 17 | 18 | 18 | 19 | 19 | 20 | 21 | 21 | 22 | 22 |
| | 0.7 | 20 | 21 | 21 | 22 | 23 | 23 | 24 | 25 | 25 | 26 |
| | 0.8 | 23 | 24 | 24 | 25 | 26 | 27 | 27 | 28 | 29 | 30 |
| | 0.9 | 26 | 27 | 28 | 28 | 29 | 30 | 31 | 32 | 33 | 33 |

Correction for tenths of height.

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | WIDTH. | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 9 | 14 | 19 | 24 | 28 | 33 | 38 | 43 | 51 | 1464 | 1511 | 1558 | 1606 | 1653 | 1700 | 1747 | 1794 | 1842 | 1889 |
| 5 | 10 | 14 | 19 | 24 | 29 | 34 | 39 | 43 | 52 | 1493 | 1541 | 1589 | 1637 | 1685 | 1733 | 1781 | 1830 | 1878 | 1926 |
| 5 | 10 | 15 | 20 | 25 | 29 | 34 | 39 | 44 | 53 | 1521 | 1570 | 1619 | 1669 | 1718 | 1767 | 1816 | 1865 | 1914 | 1963 |
| 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 54 | 1550 | 1600 | 1650 | 1700 | 1750 | 1800 | 1850 | 1900 | 1950 | 2000 |
| 5 | 10 | 15 | 20 | 25 | 31 | 36 | 41 | 46 | 55 | 1579 | 1630 | 1681 | 1731 | 1782 | 1833 | 1884 | 1935 | 1986 | 2037 |
| 5 | 10 | 16 | 21 | 26 | 31 | 36 | 41 | 47 | 56 | 1607 | 1659 | 1711 | 1763 | 1815 | 1867 | 1919 | 1970 | 2022 | 2074 |
| 5 | 11 | 16 | 21 | 26 | 32 | 37 | 42 | 48 | 57 | 1636 | 1689 | 1742 | 1794 | 1847 | 1900 | 1953 | 2006 | 2058 | 2111 |
| 5 | 11 | 16 | 21 | 27 | 32 | 38 | 43 | 48 | 58 | 1665 | 1719 | 1772 | 1826 | 1880 | 1933 | 1987 | 2041 | 2094 | 2148 |
| 5 | 11 | 16 | 22 | 27 | 33 | 38 | 44 | 49 | 59 | 1694 | 1748 | 1803 | 1857 | 1912 | 1967 | 2021 | 2076 | 2131 | 2185 |
| 6 | 11 | 17 | 22 | 28 | 33 | 39 | 44 | 50 | 60 | 1722 | 1778 | 1833 | 1889 | 1944 | 2000 | 2056 | 2111 | 2167 | 2222 |
| 6 | 11 | 17 | 23 | 28 | 34 | 40 | 45 | 51 | 61 | 1751 | 1807 | 1864 | 1920 | 1977 | 2033 | 2090 | 2146 | 2203 | 2259 |
| 6 | 11 | 17 | 23 | 29 | 34 | 40 | 46 | 52 | 62 | 1780 | 1837 | 1894 | 1952 | 2009 | 2067 | 2124 | 2181 | 2239 | 2296 |
| 6 | 12 | 18 | 23 | 29 | 35 | 41 | 47 | 53 | 63 | 1808 | 1867 | 1925 | 1983 | 2042 | 2100 | 2158 | 2217 | 2275 | 2333 |
| 6 | 12 | 18 | 24 | 30 | 36 | 41 | 47 | 53 | 64 | 1837 | 1896 | 1956 | 2015 | 2074 | 2133 | 2193 | 2252 | 2311 | 2370 |
| 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 65 | 1866 | 1926 | 1986 | 2046 | 2106 | 2167 | 2227 | 2287 | 2347 | 2407 |
| 6 | 12 | 18 | 24 | 31 | 37 | 43 | 49 | 55 | 66 | 1894 | 1956 | 2017 | 2078 | 2139 | 2200 | 2261 | 2322 | 2383 | 2444 |
| 6 | 12 | 19 | 25 | 31 | 37 | 43 | 50 | 56 | 67 | 1923 | 1985 | 2047 | 2109 | 2171 | 2233 | 2295 | 2357 | 2419 | 2481 |
| 6 | 13 | 19 | 25 | 31 | 38 | 44 | 50 | 57 | 68 | 1952 | 2015 | 2078 | 2141 | 2204 | 2267 | 2330 | 2393 | 2456 | 2519 |
| 6 | 13 | 19 | 26 | 32 | 38 | 45 | 51 | 58 | 69 | 1981 | 2044 | 2108 | 2172 | 2236 | 2300 | 2364 | 2428 | 2492 | 2556 |
| 6 | 13 | 19 | 26 | 32 | 39 | 45 | 52 | 58 | 70 | 2009 | 2074 | 2139 | 2204 | 2269 | 2333 | 2398 | 2463 | 2528 | 2593 |
| 7 | 13 | 20 | 26 | 33 | 39 | 46 | 53 | 59 | 71 | 2038 | 2104 | 2169 | 2235 | 2301 | 2367 | 2432 | 2498 | 2564 | 2630 |
| 7 | 13 | 20 | 27 | 33 | 40 | 47 | 53 | 60 | 72 | 2067 | 2133 | 2200 | 2267 | 2333 | 2400 | 2467 | 2533 | 2600 | 2667 |
| 7 | 14 | 20 | 27 | 34 | 41 | 47 | 54 | 61 | 73 | 2095 | 2163 | 2231 | 2298 | 2366 | 2433 | 2501 | 2569 | 2636 | 2704 |
| 7 | 14 | 21 | 27 | 34 | 41 | 48 | 55 | 62 | 74 | 2124 | 2193 | 2261 | 2330 | 2398 | 2467 | 2535 | 2604 | 2672 | 2741 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 75 | 2153 | 2222 | 2292 | 2361 | 2431 | 2500 | 2569 | 2639 | 2708 | 2778 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 76 | 2181 | 2252 | 2322 | 2393 | 2463 | 2533 | 2604 | 2674 | 2744 | 2815 |
| 7 | 14 | 21 | 29 | 36 | 43 | 50 | 57 | 64 | 77 | 2210 | 2281 | 2353 | 2424 | 2495 | 2567 | 2638 | 2709 | 2781 | 2852 |
| 7 | 14 | 22 | 29 | 36 | 43 | 51 | 58 | 65 | 78 | 2239 | 2311 | 2383 | 2456 | 2528 | 2600 | 2672 | 2744 | 2817 | 2889 |
| 7 | 15 | 22 | 29 | 37 | 44 | 51 | 59 | 66 | 79 | 2268 | 2341 | 2414 | 2487 | 2560 | 2633 | 2706 | 2780 | 2853 | 2926 |
| 7 | 15 | 22 | 30 | 37 | 44 | 52 | 59 | 67 | 80 | 2296 | 2370 | 2444 | 2519 | 2593 | 2667 | 2741 | 2815 | 2889 | 2963 |
| 8 | 15 | 23 | 30 | 37 | 45 | 53 | 60 | 68 | 81 | 2325 | 2400 | 2475 | 2550 | 2625 | 2700 | 2775 | 2850 | 2925 | 3000 |
| 8 | 15 | 23 | 30 | 38 | 46 | 53 | 61 | 68 | 82 | 2354 | 2430 | 2506 | 2581 | 2657 | 2733 | 2809 | 2885 | 2961 | 3037 |
| 8 | 15 | 23 | 31 | 38 | 46 | 54 | 61 | 69 | 83 | 2382 | 2459 | 2536 | 2613 | 2690 | 2767 | 2844 | 2920 | 2997 | 3074 |
| 8 | 16 | 23 | 31 | 39 | 47 | 54 | 62 | 70 | 84 | 2411 | 2489 | 2567 | 2644 | 2722 | 2800 | 2878 | 2956 | 3033 | 3111 |
| 8 | 16 | 24 | 31 | 39 | 47 | 55 | 63 | 71 | 85 | 2440 | 2519 | 2597 | 2676 | 2755 | 2833 | 2912 | 2991 | 3069 | 3148 |
| 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 86 | 2469 | 2548 | 2628 | 2707 | 2787 | 2867 | 2946 | 3026 | 3106 | 3185 |
| 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 73 | 87 | 2497 | 2578 | 2658 | 2739 | 2819 | 2900 | 2981 | 3061 | 3142 | 3222 |
| 8 | 16 | 24 | 33 | 41 | 49 | 57 | 65 | 73 | 88 | 2526 | 2607 | 2689 | 2770 | 2852 | 2933 | 3015 | 3096 | 3178 | 3259 |
| 8 | 16 | 25 | 33 | 41 | 49 | 58 | 66 | 74 | 89 | 2555 | 2637 | 2719 | 2802 | 2884 | 2967 | 3049 | 3131 | 3214 | 3296 |
| 8 | 17 | 25 | 33 | 42 | 50 | 58 | 67 | 75 | 90 | 2583 | 2667 | 2750 | 2833 | 2917 | 3000 | 3083 | 3167 | 3250 | 3333 |
| 8 | 17 | 25 | 34 | 42 | 51 | 59 | 67 | 76 | 91 | 2612 | 2696 | 2781 | 2865 | 2949 | 3033 | 3118 | 3202 | 3286 | 3370 |
| 9 | 17 | 26 | 34 | 43 | 51 | 60 | 68 | 77 | 92 | 2641 | 2726 | 2811 | 2896 | 2981 | 3067 | 3152 | 3237 | 3322 | 3407 |
| 9 | 17 | 26 | 34 | 43 | 52 | 60 | 69 | 78 | 93 | 2669 | 2756 | 2842 | 2928 | 3014 | 3100 | 3186 | 3272 | 3358 | 3444 |
| 9 | 17 | 26 | 35 | 44 | 52 | 61 | 70 | 78 | 94 | 2698 | 2785 | 2872 | 2959 | 3046 | 3133 | 3220 | 3307 | 3394 | 3481 |
| 9 | 18 | 26 | 35 | 44 | 53 | 62 | 70 | 79 | 95 | 2727 | 2815 | 2903 | 2991 | 3079 | 3167 | 3255 | 3343 | 3431 | 3519 |
| 9 | 18 | 27 | 36 | 44 | 53 | 62 | 71 | 80 | 96 | 2756 | 2844 | 2933 | 3022 | 3111 | 3200 | 3289 | 3378 | 3467 | 3556 |
| 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 97 | 2784 | 2874 | 2964 | 3054 | 3144 | 3233 | 3323 | 3413 | 3503 | 3593 |
| 9 | 18 | 27 | 36 | 45 | 54 | 64 | 73 | 82 | 98 | 2813 | 2904 | 2994 | 3085 | 3176 | 3267 | 3357 | 3448 | 3539 | 3630 |
| 9 | 18 | 28 | 37 | 46 | 55 | 64 | 73 | 83 | 99 | 2842 | 2933 | 3025 | 3117 | 3208 | 3300 | 3392 | 3483 | 3575 | 3667 |
| 9 | 19 | 28 | 37 | 46 | 56 | 65 | 74 | 83 | 100 | 2870 | 2963 | 3056 | 3148 | 3241 | 3333 | 3426 | 3519 | 3611 | 3704 |

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 0.1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 |
| | | | | | | | | | 0.2 | 6 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 7 |
| | | | | | | | | | 0.3 | 9 | 9 | 9 | 9 | 10 | 10 | 10 | 11 | 11 | 11 |
| | | | | | | | | | 0.4 | 11 | 12 | 12 | 13 | 13 | 13 | 14 | 14 | 14 | 15 |
| | | | | | | | | | 0.5 | 14 | 15 | 15 | 16 | 16 | 17 | 17 | 18 | 18 | 19 |
| | | | | | | | | | 0.6 | 17 | 18 | 18 | 19 | 19 | 20 | 21 | 21 | 22 | 22 |
| | | | | | | | | | 0.7 | 20 | 21 | 21 | 22 | 23 | 23 | 24 | 25 | 25 | 26 |
| | | | | | | | | | 0.8 | 23 | 24 | 24 | 25 | 26 | 27 | 27 | 28 | 29 | 30 |
| | | | | | | | | | 0.9 | 26 | 27 | 28 | 28 | 29 | 30 | 31 | 32 | 33 | 33 |

Correction for tenths of width.

Correction for tenths of height.

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | WIDTH. | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1 | 1 | 1 | 1 | 1 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 44 | 45 | 46 |
| | | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 76 | 78 | 80 | 81 | 83 | 85 | 87 | 89 | 91 | 93 |
| | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 114 | 117 | 119 | 122 | 125 | 128 | 131 | 133 | 136 | 139 |
| | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 4 | 152 | 156 | 159 | 163 | 167 | 170 | 174 | 178 | 181 | 185 |
| | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 190 | 194 | 199 | 204 | 208 | 213 | 218 | 222 | 227 | 231 |
| 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 6 | 228 | 233 | 239 | 244 | 250 | 256 | 261 | 267 | 272 | 278 |
| 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 6 | 7 | 266 | 272 | 279 | 285 | 292 | 298 | 305 | 311 | 318 | 324 |
| 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 8 | 304 | 311 | 319 | 326 | 333 | 341 | 348 | 356 | 363 | 370 |
| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 342 | 350 | 358 | 367 | 375 | 383 | 392 | 400 | 408 | 417 |
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 10 | 380 | 389 | 398 | 407 | 417 | 426 | 435 | 444 | 454 | 463 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 418 | 428 | 438 | 448 | 458 | 469 | 479 | 489 | 499 | 509 |
| 1 | 2 | 3 | 4 | 6 | 7 | 8 | 9 | 10 | 12 | 456 | 467 | 478 | 489 | 500 | 511 | 522 | 533 | 544 | 556 |
| 1 | 2 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 13 | 494 | 506 | 518 | 530 | 542 | 554 | 566 | 578 | 590 | 602 |
| 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 12 | 14 | 531 | 544 | 557 | 570 | 583 | 596 | 609 | 622 | 635 | 648 |
| 1 | 3 | 4 | 6 | 7 | 8 | 10 | 11 | 12 | 15 | 569 | 583 | 597 | 611 | 625 | 639 | 653 | 667 | 681 | 694 |
| 1 | 3 | 4 | 6 | 7 | 9 | 10 | 12 | 13 | 16 | 607 | 622 | 637 | 652 | 667 | 681 | 696 | 711 | 726 | 741 |
| 2 | 3 | 5 | 6 | 8 | 9 | 11 | 13 | 14 | 17 | 645 | 661 | 677 | 693 | 708 | 724 | 740 | 756 | 771 | 787 |
| 2 | 3 | 5 | 7 | 8 | 10 | 12 | 13 | 15 | 18 | 683 | 700 | 717 | 733 | 750 | 767 | 783 | 800 | 817 | 833 |
| 2 | 4 | 5 | 7 | 9 | 11 | 12 | 14 | 16 | 19 | 721 | 739 | 756 | 774 | 792 | 809 | 827 | 844 | 862 | 880 |
| 2 | 4 | 6 | 7 | 9 | 11 | 13 | 15 | 17 | 20 | 759 | 778 | 796 | 815 | 833 | 852 | 870 | 889 | 907 | 926 |
| 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 21 | 797 | 817 | 836 | 856 | 875 | 894 | 914 | 933 | 953 | 972 |
| 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 22 | 835 | 856 | 876 | 896 | 917 | 937 | 957 | 978 | 998 | 1019 |
| 2 | 4 | 6 | 9 | 11 | 13 | 15 | 17 | 19 | 23 | 873 | 894 | 916 | 937 | 958 | 980 | 1001 | 1022 | 1044 | 1065 |
| 2 | 4 | 7 | 9 | 11 | 13 | 16 | 18 | 20 | 24 | 911 | 933 | 956 | 978 | 1000 | 1022 | 1044 | 1067 | 1089 | 1111 |
| 2 | 5 | 7 | 9 | 12 | 14 | 16 | 19 | 21 | 25 | 949 | 972 | 995 | 1019 | 1042 | 1065 | 1088 | 1111 | 1134 | 1157 |
| 2 | 5 | 7 | 10 | 12 | 14 | 17 | 19 | 22 | 26 | 987 | 1011 | 1035 | 1059 | 1083 | 1107 | 1131 | 1156 | 1180 | 1204 |
| 3 | 5 | 8 | 10 | 12 | 15 | 18 | 20 | 23 | 27 | 1025 | 1050 | 1075 | 1100 | 1125 | 1150 | 1175 | 1200 | 1225 | 1250 |
| 3 | 5 | 8 | 10 | 13 | 16 | 18 | 21 | 23 | 28 | 1063 | 1089 | 1115 | 1141 | 1167 | 1193 | 1219 | 1244 | 1270 | 1296 |
| 3 | 5 | 8 | 11 | 13 | 16 | 19 | 21 | 24 | 29 | 1101 | 1128 | 1155 | 1181 | 1208 | 1235 | 1262 | 1289 | 1316 | 1343 |
| 3 | 6 | 8 | 11 | 14 | 17 | 19 | 22 | 25 | 30 | 1139 | 1167 | 1194 | 1222 | 1250 | 1278 | 1306 | 1333 | 1361 | 1389 |
| 3 | 6 | 9 | 11 | 14 | 17 | 20 | 23 | 26 | 31 | 1177 | 1206 | 1234 | 1263 | 1292 | 1320 | 1349 | 1378 | 1406 | 1435 |
| 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 32 | 1215 | 1244 | 1274 | 1304 | 1333 | 1363 | 1393 | 1422 | 1452 | 1481 |
| 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 28 | 33 | 1253 | 1283 | 1314 | 1344 | 1375 | 1406 | 1436 | 1467 | 1497 | 1528 |
| 3 | 6 | 9 | 13 | 16 | 19 | 22 | 25 | 28 | 34 | 1291 | 1322 | 1354 | 1385 | 1417 | 1448 | 1480 | 1511 | 1543 | 1574 |
| 3 | 6 | 10 | 13 | 16 | 19 | 23 | 26 | 29 | 35 | 1329 | 1361 | 1394 | 1426 | 1458 | 1491 | 1523 | 1556 | 1588 | 1620 |
| 3 | 7 | 10 | 13 | 17 | 20 | 23 | 27 | 30 | 36 | 1367 | 1400 | 1433 | 1467 | 1500 | 1533 | 1567 | 1600 | 1633 | 1667 |
| 3 | 7 | 10 | 14 | 17 | 21 | 24 | 27 | 31 | 37 | 1405 | 1439 | 1473 | 1507 | 1542 | 1576 | 1610 | 1644 | 1679 | 1713 |
| 4 | 7 | 11 | 14 | 18 | 21 | 25 | 28 | 32 | 38 | 1443 | 1478 | 1513 | 1548 | 1583 | 1619 | 1654 | 1689 | 1724 | 1759 |
| 4 | 7 | 11 | 14 | 18 | 22 | 25 | 29 | 33 | 39 | 1481 | 1517 | 1553 | 1589 | 1625 | 1661 | 1697 | 1733 | 1769 | 1806 |
| 4 | 7 | 11 | 15 | 19 | 22 | 26 | 30 | 33 | 40 | 1519 | 1556 | 1593 | 1630 | 1667 | 1704 | 1741 | 1778 | 1815 | 1852 |
| 4 | 8 | 11 | 15 | 19 | 23 | 27 | 30 | 34 | 41 | 1556 | 1594 | 1632 | 1670 | 1708 | 1746 | 1784 | 1822 | 1860 | 1898 |
| 4 | 8 | 12 | 16 | 19 | 23 | 27 | 31 | 35 | 42 | 1594 | 1633 | 1672 | 1711 | 1750 | 1789 | 1828 | 1867 | 1906 | 1944 |
| 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 43 | 1632 | 1672 | 1712 | 1752 | 1792 | 1831 | 1871 | 1911 | 1951 | 1991 |
| 4 | 8 | 12 | 16 | 20 | 24 | 29 | 33 | 37 | 44 | 1670 | 1711 | 1752 | 1793 | 1833 | 1874 | 1915 | 1956 | 1996 | 2037 |
| 4 | 8 | 13 | 17 | 21 | 25 | 29 | 33 | 38 | 45 | 1708 | 1750 | 1792 | 1833 | 1875 | 1917 | 1958 | 2000 | 2042 | 2083 |
| 4 | 9 | 13 | 17 | 21 | 26 | 30 | 34 | 38 | 46 | 1746 | 1789 | 1831 | 1874 | 1917 | 1959 | 2002 | 2044 | 2087 | 2130 |
| 4 | 9 | 13 | 17 | 22 | 26 | 30 | 35 | 39 | 47 | 1784 | 1828 | 1871 | 1915 | 1958 | 2002 | 2045 | 2089 | 2132 | 2176 |
| 4 | 9 | 13 | 18 | 22 | 27 | 31 | 36 | 40 | 48 | 1822 | 1867 | 1911 | 1956 | 2000 | 2044 | 2089 | 2133 | 2178 | 2222 |
| 5 | 9 | 14 | 18 | 23 | 27 | 32 | 36 | 41 | 49 | 1860 | 1906 | 1951 | 1996 | 2042 | 2087 | 2132 | 2178 | 2223 | 2269 |
| 5 | 9 | 14 | 19 | 23 | 28 | 32 | 37 | 42 | 50 | 1898 | 1944 | 1991 | 2037 | 2083 | 2130 | 2176 | 2222 | 2269 | 2315 |
| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |

| Correction for tenths of width. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 |
| 0.2 | 8 | 8 | 8 | 8 | 8 | 9 | 9 | 9 | 9 | 9 |
| 0.3 | 11 | 12 | 12 | 12 | 13 | 13 | 13 | 13 | 14 | 14 |
| 0.4 | 15 | 16 | 16 | 16 | 17 | 17 | 17 | 18 | 18 | 19 |
| 0.5 | 19 | 19 | 20 | 20 | 21 | 21 | 22 | 22 | 23 | 23 |
| 0.6 | 23 | 23 | 24 | 24 | 25 | 26 | 26 | 27 | 27 | 28 |
| 0.7 | 27 | 27 | 28 | 29 | 29 | 30 | 30 | 31 | 32 | 32 |
| 0.8 | 30 | 31 | 32 | 33 | 33 | 34 | 35 | 36 | 36 | 37 |
| 0.9 | 34 | 35 | 36 | 37 | 38 | 38 | 39 | 40 | 41 | 42 |



Correction for tenths of height.

Correction for tenths of height.

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | WIDTH. | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 9 | 14 | 19 | 24 | 28 | 33 | 38 | 43 | 51 | 1936 | 1983 | 2031 | 2078 | 2125 | 2172 | 2219 | 2267 | 2314 | 2361 |
| 5 | 10 | 14 | 19 | 24 | 29 | 34 | 39 | 43 | 52 | 1974 | 2022 | 2070 | 2119 | 2167 | 2215 | 2263 | 2311 | 2359 | 2407 |
| 5 | 10 | 15 | 20 | 25 | 29 | 34 | 39 | 44 | 53 | 2012 | 2061 | 2110 | 2159 | 2208 | 2257 | 2306 | 2356 | 2405 | 2454 |
| 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 54 | 2050 | 2100 | 2150 | 2200 | 2250 | 2300 | 2350 | 2400 | 2450 | 2500 |
| 5 | 10 | 15 | 20 | 25 | 31 | 36 | 41 | 46 | 55 | 2088 | 2139 | 2190 | 2241 | 2292 | 2343 | 2394 | 2444 | 2495 | 2546 |
| 5 | 10 | 16 | 21 | 26 | 31 | 36 | 41 | 47 | 56 | 2126 | 2178 | 2230 | 2281 | 2333 | 2385 | 2437 | 2489 | 2541 | 2593 |
| 5 | 11 | 16 | 21 | 26 | 32 | 37 | 42 | 48 | 57 | 2164 | 2217 | 2269 | 2322 | 2375 | 2428 | 2481 | 2533 | 2586 | 2639 |
| 5 | 11 | 16 | 21 | 27 | 32 | 38 | 43 | 48 | 58 | 2202 | 2256 | 2309 | 2363 | 2417 | 2470 | 2524 | 2578 | 2631 | 2685 |
| 5 | 11 | 16 | 22 | 27 | 33 | 38 | 44 | 49 | 59 | 2240 | 2294 | 2349 | 2404 | 2458 | 2513 | 2568 | 2622 | 2677 | 2731 |
| 6 | 11 | 17 | 22 | 28 | 33 | 39 | 44 | 50 | 60 | 2278 | 2333 | 2389 | 2444 | 2500 | 2556 | 2611 | 2667 | 2722 | 2778 |
| 6 | 11 | 17 | 23 | 28 | 34 | 40 | 45 | 51 | 61 | 2316 | 2372 | 2429 | 2485 | 2542 | 2598 | 2655 | 2711 | 2768 | 2824 |
| 6 | 11 | 17 | 23 | 29 | 34 | 40 | 46 | 52 | 62 | 2354 | 2411 | 2469 | 2526 | 2583 | 2641 | 2698 | 2756 | 2813 | 2870 |
| 6 | 12 | 18 | 23 | 29 | 35 | 41 | 47 | 53 | 63 | 2392 | 2450 | 2508 | 2567 | 2625 | 2683 | 2742 | 2800 | 2858 | 2917 |
| 6 | 12 | 18 | 24 | 30 | 36 | 41 | 47 | 53 | 64 | 2430 | 2489 | 2548 | 2607 | 2667 | 2726 | 2785 | 2844 | 2904 | 2963 |
| 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 65 | 2468 | 2528 | 2588 | 2648 | 2708 | 2769 | 2829 | 2889 | 2949 | 3009 |
| 6 | 12 | 18 | 24 | 31 | 37 | 43 | 49 | 55 | 66 | 2506 | 2567 | 2628 | 2689 | 2750 | 2811 | 2872 | 2933 | 2994 | 3056 |
| 6 | 12 | 19 | 25 | 31 | 37 | 43 | 50 | 56 | 67 | 2544 | 2606 | 2668 | 2730 | 2792 | 2854 | 2916 | 2978 | 3040 | 3102 |
| 6 | 13 | 19 | 25 | 31 | 38 | 44 | 50 | 57 | 68 | 2581 | 2644 | 2707 | 2770 | 2833 | 2896 | 2959 | 3022 | 3085 | 3148 |
| 6 | 13 | 19 | 26 | 32 | 38 | 45 | 51 | 58 | 69 | 2619 | 2683 | 2747 | 2811 | 2875 | 2939 | 3003 | 3067 | 3131 | 3194 |
| 6 | 13 | 19 | 26 | 32 | 39 | 45 | 52 | 58 | 70 | 2657 | 2722 | 2787 | 2852 | 2917 | 2981 | 3046 | 3111 | 3176 | 3241 |
| 7 | 13 | 20 | 26 | 33 | 39 | 46 | 53 | 59 | 71 | 2695 | 2761 | 2827 | 2893 | 2958 | 3024 | 3090 | 3156 | 3221 | 3287 |
| 7 | 13 | 20 | 27 | 33 | 40 | 47 | 53 | 60 | 72 | 2733 | 2800 | 2867 | 2933 | 3000 | 3067 | 3133 | 3200 | 3267 | 3333 |
| 7 | 14 | 20 | 27 | 34 | 41 | 47 | 54 | 61 | 73 | 2771 | 2839 | 2906 | 2974 | 3042 | 3109 | 3177 | 3244 | 3312 | 3380 |
| 7 | 14 | 21 | 27 | 34 | 41 | 48 | 55 | 62 | 74 | 2809 | 2878 | 2946 | 3015 | 3083 | 3152 | 3220 | 3289 | 3357 | 3426 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 75 | 2847 | 2917 | 2986 | 3056 | 3125 | 3194 | 3264 | 3333 | 3403 | 3472 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 76 | 2885 | 2956 | 3026 | 3096 | 3167 | 3237 | 3307 | 3378 | 3448 | 3519 |
| 7 | 14 | 21 | 29 | 36 | 43 | 50 | 57 | 64 | 77 | 2923 | 2994 | 3066 | 3137 | 3208 | 3280 | 3351 | 3422 | 3494 | 3565 |
| 7 | 14 | 22 | 29 | 36 | 43 | 51 | 58 | 65 | 78 | 2961 | 3033 | 3106 | 3178 | 3250 | 3322 | 3394 | 3467 | 3539 | 3611 |
| 7 | 15 | 22 | 29 | 37 | 44 | 51 | 59 | 66 | 79 | 2999 | 3072 | 3145 | 3219 | 3292 | 3365 | 3438 | 3511 | 3584 | 3657 |
| 7 | 15 | 22 | 30 | 37 | 44 | 52 | 59 | 67 | 80 | 3037 | 3111 | 3185 | 3259 | 3333 | 3407 | 3481 | 3556 | 3630 | 3704 |
| 8 | 15 | 23 | 30 | 37 | 45 | 53 | 60 | 68 | 81 | 3075 | 3150 | 3225 | 3300 | 3375 | 3450 | 3525 | 3600 | 3675 | 3750 |
| 8 | 15 | 23 | 30 | 38 | 46 | 53 | 61 | 68 | 82 | 3113 | 3189 | 3265 | 3341 | 3417 | 3493 | 3569 | 3644 | 3720 | 3796 |
| 8 | 15 | 23 | 31 | 38 | 46 | 54 | 61 | 69 | 83 | 3151 | 3228 | 3305 | 3381 | 3458 | 3535 | 3612 | 3689 | 3766 | 3843 |
| 8 | 16 | 23 | 31 | 39 | 47 | 54 | 62 | 70 | 84 | 3189 | 3267 | 3344 | 3422 | 3500 | 3578 | 3656 | 3733 | 3811 | 3889 |
| 8 | 16 | 24 | 31 | 39 | 47 | 55 | 63 | 71 | 85 | 3227 | 3306 | 3384 | 3463 | 3542 | 3620 | 3699 | 3778 | 3856 | 3935 |
| 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 86 | 3265 | 3344 | 3424 | 3504 | 3583 | 3663 | 3743 | 3822 | 3902 | 3981 |
| 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 73 | 87 | 3303 | 3383 | 3464 | 3544 | 3625 | 3706 | 3786 | 3867 | 3947 | 4028 |
| 8 | 16 | 24 | 33 | 41 | 49 | 57 | 65 | 73 | 88 | 3341 | 3422 | 3504 | 3585 | 3667 | 3748 | 3830 | 3911 | 3993 | 4074 |
| 8 | 16 | 25 | 33 | 41 | 49 | 58 | 66 | 74 | 89 | 3379 | 3461 | 3544 | 3626 | 3708 | 3791 | 3873 | 3956 | 4038 | 4120 |
| 8 | 17 | 25 | 33 | 42 | 50 | 58 | 67 | 75 | 90 | 3417 | 3500 | 3583 | 3667 | 3750 | 3833 | 3917 | 4000 | 4083 | 4167 |
| 8 | 17 | 25 | 34 | 42 | 51 | 59 | 67 | 76 | 91 | 3455 | 3539 | 3623 | 3707 | 3792 | 3876 | 3960 | 4044 | 4129 | 4213 |
| 9 | 17 | 26 | 34 | 43 | 51 | 60 | 68 | 77 | 92 | 3493 | 3578 | 3663 | 3748 | 3833 | 3919 | 4004 | 4089 | 4174 | 4259 |
| 9 | 17 | 26 | 34 | 43 | 52 | 60 | 69 | 78 | 93 | 3531 | 3617 | 3703 | 3789 | 3875 | 3961 | 4047 | 4133 | 4219 | 4306 |
| 9 | 17 | 26 | 35 | 44 | 52 | 61 | 70 | 78 | 94 | 3569 | 3656 | 3743 | 3830 | 3917 | 4004 | 4091 | 4178 | 4265 | 4352 |
| 9 | 18 | 26 | 35 | 44 | 53 | 62 | 70 | 79 | 95 | 3606 | 3694 | 3782 | 3870 | 3958 | 4046 | 4134 | 4222 | 4310 | 4398 |
| 9 | 18 | 27 | 36 | 44 | 53 | 62 | 71 | 80 | 96 | 3644 | 3733 | 3822 | 3911 | 4000 | 4089 | 4178 | 4267 | 4356 | 4444 |
| 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 97 | 3682 | 3772 | 3862 | 3952 | 4042 | 4131 | 4221 | 4311 | 4401 | 4491 |
| 9 | 18 | 27 | 36 | 45 | 54 | 64 | 73 | 82 | 98 | 3720 | 3811 | 3902 | 3993 | 4083 | 4174 | 4265 | 4356 | 4446 | 4537 |
| 9 | 18 | 28 | 37 | 46 | 55 | 64 | 73 | 83 | 99 | 3758 | 3850 | 3942 | 4033 | 4125 | 4217 | 4308 | 4400 | 4492 | 4583 |
| 9 | 19 | 28 | 37 | 46 | 56 | 65 | 74 | 83 | 100 | 3796 | 3889 | 3981 | 4074 | 4167 | 4259 | 4352 | 4444 | 4537 | 4630 |
| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |

| Correction for tenths of width. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 |
| 0.2 | 8 | 8 | 8 | 8 | 8 | 9 | 9 | 9 | 9 | 9 |
| 0.3 | 11 | 12 | 12 | 12 | 13 | 13 | 13 | 13 | 14 | 14 |
| 0.4 | 15 | 16 | 16 | 16 | 17 | 17 | 17 | 18 | 18 | 19 |
| 0.5 | 19 | 19 | 20 | 20 | 21 | 21 | 22 | 22 | 23 | 23 |
| 0.6 | 23 | 23 | 24 | 24 | 25 | 26 | 26 | 27 | 27 | 28 |
| 0.7 | 27 | 27 | 28 | 29 | 29 | 30 | 30 | 31 | 32 | 32 |
| 0.8 | 30 | 31 | 32 | 33 | 33 | 34 | 35 | 36 | 36 | 37 |
| 0.9 | 34 | 35 | 36 | 37 | 38 | 38 | 39 | 40 | 41 | 42 |

# TABLE

— OF —

# Prismoidal Corrections for Triangular Prismoids for Railway Earthwork,

IN CUBIC YARDS,

**To be applied to the approximate volume found by averaging end areas.**

Correction for tenths of height—height′.

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | w′—w. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1 | | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 |
| | | | | | | | | 1 | 2 | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 6 | 6 |
| | | | | | 1 | 1 | 1 | 1 | 3 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| | | | | 1 | 1 | 1 | 1 | 1 | 4 | 1 | 2 | 4 | 5 | 6 | 7 | 9 | 10 | 11 | 12 |
| | | | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 2 | 3 | 5 | 6 | 8 | 9 | 11 | 12 | 14 | 15 |
| | | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 6 | 2 | 4 | 6 | 7 | 9 | 11 | 13 | 15 | 17 | 19 |
| | | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 7 | 2 | 4 | 6 | 9 | 11 | 13 | 15 | 17 | 19 | 22 |
| | | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 8 | 2 | 5 | 7 | 10 | 12 | 15 | 17 | 20 | 22 | 25 |
| | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 9 | 3 | 6 | 8 | 11 | 14 | 17 | 19 | 22 | 25 | 28 |
| | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 10 | 3 | 6 | 9 | 12 | 15 | 19 | 22 | 25 | 28 | 31 |
| | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 11 | 3 | 7 | 10 | 14 | 17 | 20 | 24 | 27 | 31 | 34 |
| | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 12 | 4 | 7 | 11 | 15 | 19 | 22 | 26 | 30 | 33 | 37 |
| | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 4 | 13 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 |
| | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 4 | 14 | 4 | 9 | 13 | 17 | 22 | 26 | 30 | 35 | 39 | 43 |
| | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 15 | 5 | 9 | 14 | 19 | 23 | 28 | 32 | 37 | 42 | 46 |
| | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 16 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 44 | 49 |
| 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 17 | 5 | 10 | 16 | 21 | 26 | 31 | 37 | 42 | 47 | 52 |
| 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 18 | 6 | 11 | 17 | 22 | 28 | 33 | 39 | 44 | 50 | 56 |
| 1 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 5 | 19 | 6 | 12 | 18 | 23 | 29 | 35 | 41 | 47 | 53 | 59 |
| 1 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 6 | 20 | 6 | 12 | 19 | 25 | 31 | 37 | 43 | 49 | 56 | 62 |
| 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 6 | 21 | 6 | 13 | 19 | 26 | 32 | 39 | 45 | 52 | 58 | 65 |
| 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 6 | 22 | 7 | 14 | 20 | 27 | 34 | 41 | 48 | 54 | 61 | 68 |
| 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 6 | 23 | 7 | 14 | 21 | 28 | 35 | 43 | 50 | 57 | 64 | 71 |
| 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 24 | 7 | 15 | 22 | 30 | 37 | 44 | 52 | 59 | 67 | 74 |
| 1 | 2 | 2 | 3 | 4 | 5 | 5 | 6 | 7 | 25 | 8 | 15 | 23 | 31 | 39 | 46 | 54 | 62 | 69 | 77 |
| 1 | 2 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 26 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 |
| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 27 | 8 | 17 | 25 | 33 | 42 | 50 | 58 | 67 | 75 | 83 |
| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 28 | 9 | 17 | 26 | 35 | 43 | 52 | 60 | 69 | 78 | 86 |
| 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 8 | 29 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90 |
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 30 | 9 | 19 | 28 | 37 | 46 | 56 | 65 | 74 | 83 | 93 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 31 | 10 | 19 | 29 | 38 | 48 | 57 | 67 | 77 | 86 | 96 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 32 | 10 | 20 | 30 | 40 | 49 | 59 | 69 | 79 | 89 | 99 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 33 | 10 | 20 | 31 | 41 | 51 | 61 | 71 | 81 | 92 | 102 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 34 | 10 | 21 | 31 | 42 | 52 | 63 | 73 | 84 | 94 | 105 |
| 1 | 2 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 35 | 11 | 22 | 32 | 43 | 54 | 65 | 76 | 86 | 97 | 108 |
| 1 | 2 | 3 | 4 | 6 | 7 | 8 | 9 | 10 | 36 | 11 | 22 | 33 | 44 | 56 | 67 | 78 | 89 | 100 | 111 |
| 1 | 2 | 3 | 5 | 6 | 7 | 8 | 9 | 10 | 37 | 11 | 23 | 34 | 46 | 57 | 69 | 80 | 91 | 103 | 114 |
| 1 | 2 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 38 | 12 | 23 | 35 | 47 | 59 | 70 | 82 | 94 | 106 | 117 |
| 1 | 2 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 39 | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | 108 | 120 |
| 1 | 2 | 4 | 5 | 6 | 7 | 9 | 10 | 11 | 40 | 12 | 25 | 37 | 49 | 62 | 74 | 86 | 99 | 111 | 123 |
| 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 11 | 41 | 13 | 25 | 38 | 51 | 63 | 76 | 89 | 101 | 114 | 127 |
| 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 12 | 42 | 13 | 26 | 39 | 52 | 65 | 78 | 91 | 104 | 117 | 130 |
| 1 | 3 | 4 | 5 | 7 | 8 | 9 | 11 | 12 | 43 | 13 | 27 | 40 | 53 | 66 | 80 | 93 | 106 | 119 | 133 |
| 1 | 3 | 4 | 5 | 7 | 8 | 10 | 11 | 12 | 44 | 14 | 27 | 41 | 54 | 68 | 81 | 95 | 109 | 122 | 136 |
| 1 | 3 | 4 | 6 | 7 | 8 | 10 | 11 | 13 | 45 | 14 | 28 | 42 | 56 | 69 | 83 | 97 | 111 | 125 | 139 |
| 1 | 3 | 4 | 6 | 7 | 9 | 10 | 11 | 13 | 46 | 14 | 28 | 43 | 57 | 71 | 85 | 99 | 114 | 128 | 142 |
| 1 | 3 | 4 | 6 | 7 | 9 | 10 | 12 | 13 | 47 | 15 | 29 | 44 | 58 | 73 | 87 | 102 | 116 | 131 | 145 |
| 1 | 3 | 4 | 6 | 7 | 9 | 10 | 12 | 13 | 48 | 15 | 30 | 44 | 59 | 74 | 89 | 104 | 119 | 133 | 148 |
| 2 | 3 | 5 | 6 | 8 | 9 | 11 | 12 | 14 | 49 | 15 | 30 | 45 | 60 | 76 | 91 | 106 | 121 | 136 | 151 |
| 2 | 3 | 5 | 6 | 8 | 9 | 11 | 12 | 14 | 50 | 15 | 31 | 46 | 62 | 77 | 93 | 108 | 123 | 139 | 154 |
| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

**Correction for tenths of width′— width.**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0.1 | | | | | | | | | |
| 0.2 | | | | | | | | 1 | 1 |
| 0.3 | | | | | | 1 | 1 | 1 | 1 |
| 0.4 | | | | | 1 | 1 | 1 | 1 | 1 |
| 0.5 | | | | 1 | 1 | 1 | 1 | 1 | 2 |
| 0.6 | | | 1 | 1 | 1 | 1 | 1 | 2 | 2 |
| 0.7 | | | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| 0.8 | | | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| 0.9 | | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 |

Correction for tenths of height—height′.

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | w′—w. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 1 | 1 | 3 | 4 | 4 | 4 | 5 | 5 | 5 | 6 | 6 | 6 |
| | | | | | | | 1 | 1 | 2 | 7 | 7 | 8 | 9 | 9 | 10 | 10 | 11 | 12 | 12 |
| | | | | | | 1 | 1 | 1 | 3 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| | | | | | 1 | 1 | 1 | 1 | 4 | 14 | 15 | 16 | 17 | 19 | 20 | 21 | 22 | 23 | 25 |
| | | | | 1 | 1 | 1 | 1 | 1 | 5 | 17 | 19 | 20 | 22 | 23 | 25 | 26 | 28 | 29 | 31 |
| | | | 1 | 1 | 1 | 1 | 1 | 2 | 6 | 20 | 22 | 24 | 26 | 28 | 30 | 31 | 33 | 35 | 37 |
| | | | 1 | 1 | 1 | 1 | 2 | 2 | 7 | 24 | 26 | 28 | 30 | 32 | 35 | 37 | 39 | 41 | 43 |
| | | | 1 | 1 | 1 | 1 | 2 | 2 | 8 | 27 | 30 | 32 | 35 | 37 | 40 | 42 | 44 | 47 | 49 |
| | | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 9 | 31 | 33 | 36 | 39 | 42 | 44 | 47 | 50 | 53 | 56 |
| | | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 10 | 34 | 37 | 40 | 43 | 46 | 49 | 52 | 56 | 59 | 62 |
| | | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 11 | 37 | 41 | 44 | 48 | 51 | 54 | 58 | 61 | 65 | 68 |
| | | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 12 | 41 | 44 | 48 | 52 | 56 | 59 | 63 | 67 | 70 | 74 |
| | | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 13 | 44 | 48 | 52 | 56 | 60 | 64 | 68 | 72 | 76 | 80 |
| | | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 14 | 48 | 52 | 56 | 60 | 65 | 69 | 73 | 78 | 82 | 86 |
| | | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 15 | 51 | 56 | 60 | 65 | 69 | 74 | 79 | 83 | 88 | 93 |
| | | 1 | 1 | 2 | 3 | 3 | 3 | 4 | 16 | 54 | 59 | 64 | 69 | 74 | 79 | 84 | 89 | 94 | 99 |
| | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 17 | 58 | 63 | 68 | 73 | 79 | 84 | 89 | 94 | 100 | 105 |
| | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 18 | 61 | 67 | 72 | 78 | 83 | 89 | 94 | 100 | 106 | 111 |
| | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 19 | 65 | 70 | 76 | 82 | 88 | 94 | 100 | 106 | 111 | 117 |
| | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 20 | 68 | 74 | 80 | 86 | 93 | 99 | 105 | 111 | 117 | 123 |
| | 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 21 | 71 | 78 | 84 | 91 | 97 | 104 | 110 | 117 | 123 | 130 |
| | 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 22 | 75 | 81 | 88 | 95 | 102 | 109 | 115 | 122 | 129 | 136 |
| | 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 23 | 78 | 85 | 92 | 99 | 106 | 114 | 121 | 128 | 135 | 142 |
| | 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 24 | 81 | 89 | 96 | 104 | 111 | 119 | 126 | 133 | 141 | 148 |
| | 1 | 2 | 2 | 3 | 4 | 5 | 5 | 6 | 25 | 85 | 93 | 100 | 108 | 116 | 123 | 131 | 139 | 147 | 154 |
| | 1 | 2 | 2 | 3 | 4 | 5 | 6 | 6 | 26 | 88 | 96 | 104 | 112 | 120 | 128 | 136 | 144 | 152 | 160 |
| | 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 27 | 92 | 100 | 108 | 117 | 125 | 133 | 142 | 150 | 158 | 167 |
| | 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 28 | 95 | 104 | 112 | 121 | 130 | 138 | 147 | 156 | 164 | 173 |
| | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 29 | 98 | 107 | 116 | 125 | 134 | 143 | 152 | 161 | 170 | 179 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 30 | 102 | 111 | 120 | 130 | 139 | 148 | 157 | 167 | 176 | 185 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 31 | 105 | 115 | 124 | 134 | 144 | 153 | 163 | 172 | 182 | 191 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 32 | 109 | 119 | 128 | 138 | 148 | 158 | 168 | 178 | 188 | 198 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 33 | 112 | 122 | 132 | 143 | 153 | 163 | 173 | 183 | 194 | 204 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 34 | 115 | 126 | 136 | 147 | 157 | 168 | 178 | 189 | 199 | 210 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 8 | 9 | 35 | 119 | 130 | 140 | 151 | 162 | 173 | 184 | 194 | 205 | 216 |
| | 1 | 2 | 3 | 4 | 6 | 7 | 8 | 9 | 36 | 122 | 133 | 144 | 156 | 167 | 178 | 189 | 200 | 211 | 222 |
| | 1 | 2 | 3 | 5 | 6 | 7 | 8 | 9 | 37 | 126 | 137 | 148 | 160 | 171 | 183 | 194 | 206 | 217 | 228 |
| | 1 | 2 | 4 | 5 | 6 | 7 | 8 | 9 | 38 | 129 | 141 | 152 | 164 | 176 | 188 | 199 | 211 | 223 | 235 |
| | 1 | 2 | 4 | 5 | 6 | 7 | 8 | 10 | 39 | 132 | 144 | 156 | 169 | 181 | 193 | 205 | 217 | 229 | 241 |
| | 1 | 2 | 4 | 5 | 6 | 7 | 9 | 10 | 40 | 136 | 148 | 160 | 173 | 185 | 198 | 210 | 222 | 235 | 247 |
| | 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 41 | 139 | 152 | 165 | 177 | 190 | 202 | 215 | 228 | 240 | 253 |
| | 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 42 | 143 | 156 | 169 | 181 | 194 | 207 | 220 | 233 | 246 | 259 |
| | 1 | 3 | 4 | 5 | 7 | 8 | 9 | 11 | 43 | 146 | 159 | 173 | 186 | 199 | 212 | 226 | 239 | 252 | 265 |
| | 1 | 3 | 4 | 5 | 7 | 8 | 10 | 11 | 44 | 149 | 163 | 177 | 190 | 204 | 217 | 231 | 244 | 258 | 272 |
| | 1 | 3 | 4 | 6 | 7 | 8 | 10 | 11 | 45 | 153 | 167 | 181 | 194 | 208 | 222 | 236 | 250 | 264 | 278 |
| | 1 | 3 | 4 | 6 | 7 | 9 | 10 | 11 | 46 | 156 | 170 | 185 | 199 | 213 | 227 | 241 | 256 | 270 | 284 |
| | 1 | 3 | 4 | 6 | 7 | 9 | 10 | 12 | 47 | 160 | 174 | 189 | 203 | 218 | 232 | 247 | 261 | 276 | 290 |
| | 1 | 3 | 4 | 6 | 7 | 9 | 10 | 12 | 48 | 163 | 178 | 193 | 207 | 222 | 237 | 252 | 267 | 281 | 296 |
| | 2 | 3 | 5 | 6 | 8 | 9 | 11 | 12 | 49 | 166 | 181 | 197 | 212 | 227 | 242 | 257 | 272 | 287 | 302 |
| | 2 | 3 | 5 | 6 | 8 | 9 | 11 | 12 | 50 | 170 | 185 | 201 | 216 | 231 | 247 | 262 | 278 | 293 | 309 |
| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |

**Correction for tenths of width′—width.**

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | | | | | | | | | | | | | | | | 1 | 1 | 1 | 1 |
| 0.2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 0.3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 0.4 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 0.5 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 0.6 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 0.7 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 0.8 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 0.9 | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 7 | 7 |

Correction for tenths of height—height′.

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | w′—w. | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1 | 6 | 7 | 7 | 7 | 8 | 8 | 8 | 9 | 9 | 9 |
| | | | | | | | | 1 | 2 | 13 | 14 | 14 | 15 | 15 | 16 | 17 | 17 | 18 | 19 |
| | | | | | 1 | 1 | 1 | 1 | 3 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| | | | | 1 | 1 | 1 | 1 | 1 | 4 | 26 | 27 | 28 | 30 | 31 | 32 | 33 | 35 | 36 | 37 |
| | | | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 32 | 34 | 35 | 37 | 39 | 40 | 42 | 43 | 45 | 46 |
| | | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 6 | 39 | 41 | 43 | 44 | 46 | 48 | 50 | 52 | 54 | 56 |
| | | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 7 | 45 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 63 | 65 |
| | | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 8 | 52 | 54 | 57 | 59 | 62 | 64 | 67 | 69 | 72 | 74 |
| | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 9 | 58 | 61 | 64 | 67 | 69 | 72 | 75 | 78 | 81 | 83 |
| | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 10 | 65 | 68 | 71 | 74 | 77 | 80 | 83 | 86 | 90 | 93 |
| | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 11 | 71 | 75 | 78 | 81 | 85 | 88 | 92 | 95 | 98 | 102 |
| | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 12 | 78 | 81 | 85 | 89 | 93 | 96 | 100 | 104 | 107 | 111 |
| | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 4 | 13 | 84 | 88 | 92 | 96 | 100 | 104 | 108 | 112 | 116 | 120 |
| | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 4 | 14 | 91 | 95 | 99 | 104 | 108 | 112 | 117 | 121 | 125 | 130 |
| | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 15 | 97 | 102 | 106 | 111 | 116 | 120 | 125 | 130 | 134 | 139 |
| | 1 | 1 | 2 | 3 | 3 | 3 | 4 | 4 | 16 | 104 | 109 | 114 | 119 | 123 | 128 | 133 | 138 | 143 | 148 |
| 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 17 | 110 | 115 | 121 | 126 | 131 | 136 | 142 | 147 | 152 | 157 |
| 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 18 | 117 | 122 | 128 | 133 | 139 | 144 | 150 | 156 | 161 | 167 |
| 1 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 5 | 19 | 123 | 129 | 135 | 141 | 147 | 152 | 158 | 164 | 170 | 176 |
| 1 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 6 | 20 | 130 | 136 | 142 | 148 | 154 | 160 | 167 | 173 | 179 | 185 |
| 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 6 | 21 | 136 | 143 | 149 | 156 | 162 | 169 | 175 | 181 | 188 | 194 |
| 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 6 | 22 | 143 | 149 | 156 | 163 | 170 | 177 | 183 | 190 | 197 | 204 |
| 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 6 | 23 | 149 | 156 | 163 | 170 | 177 | 185 | 192 | 199 | 206 | 213 |
| 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 24 | 156 | 163 | 170 | 178 | 185 | 193 | 200 | 207 | 215 | 222 |
| 1 | 2 | 2 | 3 | 4 | 5 | 5 | 6 | 7 | 25 | 162 | 170 | 177 | 185 | 193 | 201 | 208 | 216 | 224 | 231 |
| 1 | 2 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 26 | 169 | 177 | 185 | 193 | 201 | 209 | 217 | 225 | 233 | 241 |
| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 27 | 175 | 183 | 192 | 200 | 208 | 217 | 225 | 233 | 242 | 250 |
| 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 28 | 181 | 190 | 199 | 207 | 216 | 225 | 233 | 242 | 251 | 259 |
| 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 8 | 29 | 188 | 197 | 206 | 215 | 224 | 233 | 242 | 251 | 260 | 269 |
| 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 30 | 194 | 204 | 213 | 222 | 231 | 241 | 250 | 259 | 269 | 278 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 31 | 201 | 210 | 220 | 230 | 239 | 249 | 258 | 268 | 277 | 287 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 32 | 207 | 217 | 227 | 237 | 247 | 257 | 267 | 277 | 286 | 296 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 33 | 214 | 224 | 234 | 244 | 255 | 265 | 275 | 285 | 295 | 306 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 34 | 220 | 231 | 241 | 252 | 262 | 273 | 283 | 294 | 304 | 315 |
| 1 | 2 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 35 | 227 | 238 | 248 | 259 | 270 | 281 | 292 | 302 | 313 | 324 |
| 1 | 2 | 3 | 4 | 6 | 7 | 8 | 9 | 10 | 36 | 233 | 244 | 256 | 267 | 278 | 289 | 300 | 311 | 322 | 333 |
| 1 | 2 | 3 | 5 | 6 | 7 | 8 | 9 | 10 | 37 | 240 | 251 | 263 | 274 | 285 | 297 | 308 | 320 | 331 | 343 |
| 1 | 2 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 38 | 246 | 258 | 270 | 281 | 293 | 305 | 317 | 328 | 340 | 352 |
| 1 | 2 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 39 | 253 | 265 | 277 | 289 | 301 | 313 | 325 | 337 | 349 | 361 |
| 1 | 2 | 4 | 5 | 6 | 7 | 9 | 10 | 11 | 40 | 259 | 272 | 284 | 296 | 309 | 321 | 333 | 346 | 358 | 370 |
| 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 11 | 41 | 266 | 278 | 291 | 304 | 316 | 329 | 342 | 354 | 367 | 380 |
| 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 12 | 42 | 272 | 285 | 298 | 311 | 324 | 337 | 350 | 363 | 376 | 389 |
| 1 | 3 | 4 | 5 | 7 | 8 | 9 | 11 | 12 | 43 | 279 | 292 | 305 | 319 | 332 | 345 | 358 | 372 | 385 | 398 |
| 1 | 3 | 4 | 5 | 7 | 8 | 10 | 11 | 12 | 44 | 285 | 299 | 312 | 326 | 340 | 353 | 367 | 380 | 394 | 407 |
| 1 | 3 | 4 | 6 | 7 | 8 | 10 | 11 | 13 | 45 | 292 | 306 | 319 | 333 | 347 | 361 | 375 | 389 | 403 | 417 |
| 1 | 3 | 4 | 6 | 7 | 9 | 10 | 11 | 13 | 46 | 298 | 312 | 327 | 341 | 355 | 369 | 383 | 398 | 412 | 426 |
| 1 | 3 | 4 | 6 | 7 | 9 | 10 | 12 | 13 | 47 | 305 | 319 | 334 | 348 | 363 | 377 | 392 | 406 | 421 | 435 |
| 1 | 3 | 4 | 6 | 7 | 9 | 10 | 12 | 13 | 48 | 311 | 326 | 341 | 356 | 370 | 385 | 400 | 415 | 430 | 444 |
| 2 | 3 | 5 | 6 | 8 | 9 | 11 | 12 | 14 | 49 | 318 | 333 | 348 | 363 | 378 | 393 | 408 | 423 | 439 | 454 |
| 2 | 3 | 5 | 6 | 8 | 9 | 11 | 12 | 14 | 50 | 324 | 340 | 355 | 370 | 386 | 401 | 417 | 432 | 448 | 463 |
| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |

Correction for tenths of width′— width.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 0.2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| 0.3 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
| 0.4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| 0.5 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 |
| 0.6 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 6 |
| 0.7 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 |
| 0.8 | 5 | 5 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 |
| 0.9 | 6 | 6 | 6 | 7 | 7 | 7 | 8 | 8 | 8 | 8 |

Correction for tenths of height—height′.

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | w′—w. | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1 | 10 | 10 | 10 | 10 | 11 | 11 | 11 | 12 | 12 | 12 |
| | | | | | | | | 1 | 2 | 19 | 20 | 20 | 21 | 22 | 22 | 23 | 23 | 24 | 25 |
| | | | | | | 1 | 1 | 1 | 3 | 29 | 30 | 31 | 31 | 32 | 33 | 34 | 35 | 36 | 37 |
| | | | | | 1 | 1 | 1 | 1 | 4 | 38 | 40 | 41 | 42 | 43 | 44 | 46 | 47 | 48 | 49 |
| | | | | 1 | 1 | 1 | 1 | 1 | 5 | 48 | 49 | 51 | 52 | 54 | 56 | 57 | 59 | 60 | 62 |
| | | | 1 | 1 | 1 | 1 | 1 | 2 | 6 | 57 | 59 | 61 | 63 | 65 | 67 | 69 | 70 | 72 | 74 |
| | | | 1 | 1 | 1 | 2 | 2 | 2 | 7 | 67 | 69 | 71 | 73 | 76 | 78 | 80 | 82 | 84 | 86 |
| | | | 1 | 1 | 1 | 2 | 2 | 2 | 8 | 77 | 79 | 81 | 84 | 86 | 89 | 91 | 94 | 96 | 99 |
| | | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 9 | 86 | 89 | 92 | 94 | 97 | 100 | 103 | 106 | 108 | 111 |
| | | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 10 | 96 | 99 | 102 | 105 | 108 | 111 | 114 | 117 | 120 | 123 |
| | | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 11 | 105 | 109 | 112 | 115 | 119 | 122 | 126 | 129 | 132 | 136 |
| | | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 12 | 115 | 119 | 122 | 126 | 130 | 133 | 137 | 141 | 144 | 148 |
| | | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 13 | 124 | 128 | 132 | 136 | 140 | 144 | 148 | 152 | 156 | 160 |
| | | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 14 | 134 | 138 | 143 | 147 | 151 | 156 | 160 | 164 | 169 | 173 |
| | | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 15 | 144 | 148 | 153 | 157 | 162 | 167 | 171 | 176 | 181 | 185 |
| | | 1 | 1 | 2 | 3 | 3 | 3 | 4 | 16 | 153 | 158 | 163 | 168 | 173 | 178 | 183 | 188 | 193 | 198 |
| | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 17 | 163 | 168 | 173 | 178 | 184 | 189 | 194 | 199 | 205 | 210 |
| | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 18 | 172 | 178 | 183 | 189 | 194 | 200 | 206 | 211 | 217 | 222 |
| | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 19 | 182 | 188 | 194 | 199 | 205 | 211 | 217 | 223 | 229 | 235 |
| | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 20 | 191 | 198 | 204 | 210 | 216 | 222 | 228 | 235 | 241 | 247 |
| | 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 21 | 201 | 207 | 214 | 220 | 227 | 233 | 240 | 246 | 253 | 259 |
| | 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 22 | 210 | 217 | 224 | 231 | 238 | 244 | 251 | 258 | 265 | 272 |
| | 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 23 | 220 | 227 | 234 | 241 | 248 | 256 | 263 | 270 | 277 | 284 |
| | 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 24 | 230 | 237 | 244 | 252 | 259 | 267 | 274 | 281 | 289 | 296 |
| | 1 | 2 | 2 | 3 | 4 | 5 | 5 | 6 | 25 | 239 | 247 | 255 | 262 | 270 | 278 | 285 | 293 | 301 | 309 |
| | 1 | 2 | 2 | 3 | 4 | 5 | 6 | 6 | 26 | 249 | 257 | 265 | 273 | 281 | 289 | 297 | 305 | 313 | 321 |
| | 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 27 | 258 | 267 | 275 | 283 | 292 | 300 | 308 | 317 | 325 | 333 |
| | 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 28 | 268 | 277 | 285 | 294 | 302 | 311 | 320 | 328 | 337 | 346 |
| | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 29 | 277 | 286 | 295 | 304 | 313 | 322 | 331 | 340 | 349 | 358 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 30 | 287 | 296 | 306 | 315 | 324 | 333 | 343 | 352 | 361 | 370 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 31 | 297 | 306 | 316 | 325 | 335 | 344 | 354 | 364 | 373 | 383 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 32 | 306 | 316 | 326 | 336 | 346 | 356 | 365 | 375 | 385 | 395 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 33 | 316 | 326 | 336 | 346 | 356 | 367 | 377 | 387 | 397 | 407 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 34 | 325 | 336 | 346 | 357 | 367 | 378 | 388 | 399 | 409 | 420 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 8 | 9 | 35 | 335 | 346 | 356 | 367 | 378 | 389 | 400 | 410 | 421 | 432 |
| | 1 | 2 | 3 | 4 | 6 | 7 | 8 | 9 | 36 | 344 | 356 | 367 | 378 | 389 | 400 | 411 | 422 | 433 | 444 |
| | 1 | 2 | 3 | 5 | 6 | 7 | 8 | 9 | 37 | 354 | 365 | 377 | 388 | 400 | 411 | 423 | 434 | 445 | 457 |
| | 1 | 2 | 4 | 5 | 6 | 7 | 8 | 9 | 38 | 364 | 375 | 387 | 399 | 410 | 422 | 434 | 446 | 457 | 469 |
| | 1 | 2 | 4 | 5 | 6 | 7 | 8 | 10 | 39 | 373 | 385 | 397 | 409 | 421 | 433 | 445 | 457 | 469 | 481 |
| | 1 | 2 | 4 | 5 | 6 | 7 | 9 | 10 | 40 | 383 | 395 | 407 | 420 | 432 | 444 | 457 | 469 | 481 | 494 |
| 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 11 | 41 | 392 | 405 | 418 | 430 | 443 | 456 | 468 | 481 | 494 | 506 |
| 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 12 | 42 | 402 | 415 | 428 | 441 | 454 | 467 | 480 | 493 | 506 | 519 |
| 1 | 3 | 4 | 5 | 7 | 8 | 9 | 11 | 12 | 43 | 411 | 425 | 438 | 451 | 465 | 478 | 491 | 504 | 518 | 531 |
| 1 | 3 | 4 | 5 | 7 | 8 | 10 | 11 | 12 | 44 | 421 | 435 | 448 | 462 | 475 | 489 | 502 | 516 | 530 | 543 |
| 1 | 3 | 4 | 6 | 7 | 8 | 10 | 11 | 13 | 45 | 431 | 444 | 458 | 472 | 486 | 500 | 514 | 528 | 542 | 556 |
| 1 | 3 | 4 | 6 | 7 | 9 | 10 | 11 | 13 | 46 | 440 | 454 | 469 | 483 | 497 | 511 | 525 | 540 | 554 | 568 |
| 1 | 3 | 4 | 6 | 7 | 9 | 10 | 12 | 13 | 47 | 450 | 464 | 479 | 493 | 508 | 522 | 537 | 551 | 566 | 580 |
| 1 | 3 | 4 | 6 | 7 | 9 | 10 | 12 | 13 | 48 | 459 | 474 | 489 | 504 | 519 | 533 | 548 | 563 | 578 | 593 |
| 2 | 3 | 5 | 6 | 8 | 9 | 11 | 12 | 14 | 49 | 469 | 484 | 499 | 514 | 529 | 544 | 560 | 575 | 590 | 605 |
| 2 | 3 | 5 | 6 | 8 | 9 | 11 | 12 | 14 | 50 | 478 | 494 | 509 | 525 | 540 | 556 | 571 | 586 | 602 | 617 |
| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |

Correction for tenths of width′—width.

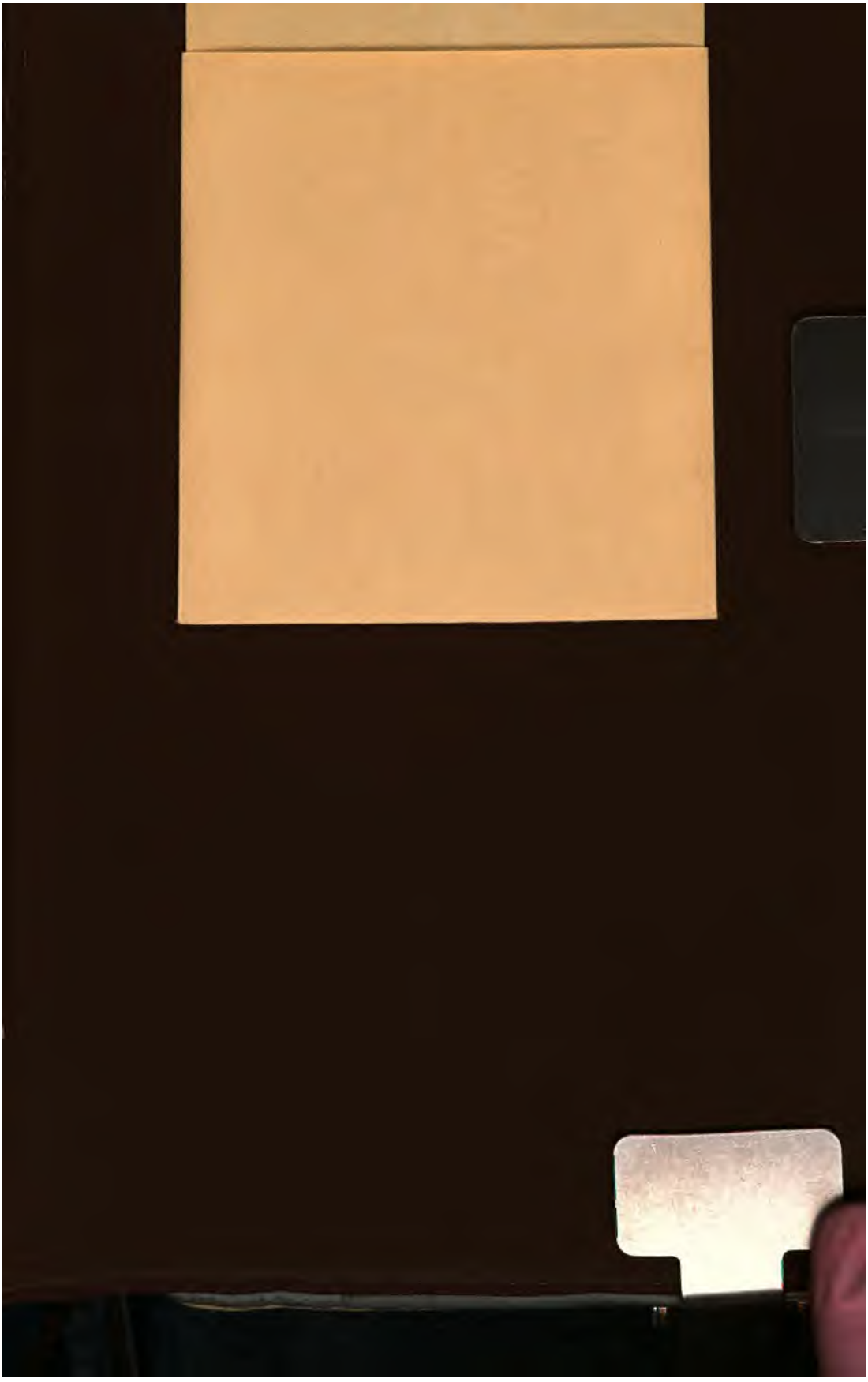
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 0.2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 0.3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 |
| 0.4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 |
| 0.5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 |
| 0.6 | 6 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 7 |
| 0.7 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 | 8 | 9 |
| 0.8 | 8 | 8 | 8 | 8 | 9 | 9 | 9 | 9 | 10 | 10 |
| 0.9 | 9 | 9 | 9 | 9 | 10 | 10 | 10 | 11 | 11 | 11 |

Correction for tenths of height—height′.

| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | w′—w. | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1 | 13 | 13 | 13 | 14 | 14 | 14 | 15 | 15 | 15 | 15 |
| | | | | | | | | 1 | 2 | 25 | 26 | 27 | 27 | 28 | 28 | 29 | 30 | 30 | 31 |
| | | | | | | 1 | 1 | 1 | 3 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 44 | 45 | 46 |
| | | | | | 1 | 1 | 1 | 1 | 4 | 51 | 52 | 53 | 54 | 56 | 57 | 58 | 59 | 60 | 62 |
| | | | | 1 | 1 | 1 | 1 | 1 | 5 | 63 | 65 | 66 | 68 | 69 | 71 | 73 | 74 | 76 | 77 |
| | | | 1 | 1 | 1 | 1 | 1 | 2 | 6 | 76 | 78 | 80 | 81 | 83 | 85 | 87 | 89 | 91 | 93 |
| | | | 1 | 1 | 1 | 2 | 2 | 2 | 7 | 89 | 91 | 93 | 95 | 97 | 99 | 102 | 104 | 106 | 108 |
| | | | 1 | 1 | 1 | 2 | 2 | 2 | 8 | 101 | 104 | 106 | 109 | 111 | 114 | 116 | 119 | 121 | 123 |
| | | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 9 | 114 | 117 | 119 | 122 | 125 | 128 | 131 | 133 | 136 | 139 |
| | | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 10 | 127 | 130 | 133 | 136 | 139 | 142 | 145 | 148 | 151 | 154 |
| | | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 11 | 139 | 143 | 146 | 149 | 153 | 156 | 160 | 163 | 166 | 170 |
| | | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 12 | 152 | 156 | 159 | 163 | 167 | 170 | 174 | 178 | 181 | 185 |
| | | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 13 | 165 | 169 | 173 | 177 | 181 | 185 | 189 | 193 | 197 | 201 |
| | | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 14 | 177 | 181 | 186 | 190 | 194 | 199 | 203 | 207 | 212 | 216 |
| | | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 15 | 190 | 194 | 199 | 204 | 208 | 213 | 218 | 222 | 227 | 231 |
| | | 1 | 1 | 2 | 3 | 3 | 3 | 4 | 16 | 202 | 207 | 212 | 217 | 222 | 227 | 232 | 237 | 242 | 247 |
| | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 17 | 215 | 220 | 226 | 231 | 236 | 241 | 247 | 252 | 257 | 262 |
| | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 18 | 228 | 233 | 239 | 244 | 250 | 256 | 261 | 267 | 272 | 278 |
| | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 19 | 240 | 246 | 252 | 258 | 264 | 270 | 276 | 281 | 287 | 293 |
| | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 20 | 253 | 259 | 265 | 272 | 278 | 284 | 290 | 296 | 302 | 309 |
| | 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 21 | 266 | 272 | 279 | 285 | 292 | 298 | 305 | 311 | 318 | 324 |
| | 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 22 | 278 | 285 | 292 | 299 | 306 | 312 | 319 | 326 | 333 | 340 |
| | 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 23 | 291 | 298 | 305 | 312 | 319 | 327 | 334 | 341 | 348 | 355 |
| | 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 24 | 304 | 311 | 319 | 326 | 333 | 341 | 348 | 356 | 363 | 370 |
| | 1 | 2 | 2 | 3 | 4 | 5 | 5 | 6 | 25 | 316 | 324 | 332 | 340 | 347 | 355 | 363 | 370 | 378 | 386 |
| | 1 | 2 | 2 | 3 | 4 | 5 | 6 | 6 | 26 | 329 | 337 | 345 | 353 | 361 | 369 | 377 | 385 | 393 | 401 |
| | 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 27 | 342 | 350 | 358 | 367 | 375 | 383 | 392 | 400 | 408 | 417 |
| | 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 28 | 354 | 363 | 372 | 380 | 389 | 398 | 406 | 415 | 423 | 432 |
| | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 29 | 367 | 376 | 385 | 394 | 403 | 412 | 421 | 430 | 439 | 448 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 30 | 380 | 389 | 398 | 407 | 417 | 426 | 435 | 444 | 454 | 463 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 31 | 392 | 402 | 411 | 421 | 431 | 440 | 450 | 459 | 469 | 478 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 32 | 405 | 415 | 425 | 435 | 444 | 454 | 464 | 474 | 484 | 494 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 33 | 418 | 428 | 438 | 448 | 458 | 469 | 479 | 489 | 499 | 509 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 34 | 430 | 441 | 451 | 462 | 472 | 483 | 493 | 504 | 514 | 525 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 8 | 9 | 35 | 443 | 454 | 465 | 475 | 486 | 497 | 508 | 519 | 529 | 540 |
| | 1 | 2 | 3 | 4 | 6 | 7 | 8 | 9 | 36 | 456 | 467 | 478 | 489 | 500 | 511 | 522 | 533 | 544 | 556 |
| | 1 | 2 | 3 | 5 | 6 | 7 | 8 | 9 | 37 | 468 | 480 | 491 | 502 | 514 | 525 | 537 | 548 | 560 | 571 |
| | 1 | 2 | 4 | 5 | 6 | 7 | 8 | 9 | 38 | 481 | 493 | 504 | 516 | 528 | 540 | 551 | 563 | 575 | 586 |
| | 1 | 2 | 4 | 5 | 6 | 7 | 8 | 10 | 39 | 494 | 506 | 518 | 530 | 542 | 554 | 566 | 578 | 590 | 602 |
| | 1 | 2 | 4 | 5 | 6 | 7 | 9 | 10 | 40 | 506 | 519 | 531 | 543 | 556 | 568 | 580 | 593 | 605 | 617 |
| | 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 41 | 519 | 531 | 544 | 557 | 569 | 582 | 595 | 607 | 620 | 633 |
| | 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 42 | 531 | 544 | 557 | 570 | 583 | 596 | 609 | 622 | 635 | 648 |
| | 1 | 3 | 4 | 5 | 7 | 8 | 9 | 11 | 43 | 544 | 557 | 571 | 584 | 597 | 610 | 624 | 637 | 650 | 664 |
| | 1 | 3 | 4 | 5 | 7 | 8 | 10 | 11 | 44 | 557 | 570 | 584 | 598 | 611 | 625 | 638 | 652 | 665 | 679 |
| | 1 | 3 | 4 | 6 | 7 | 8 | 10 | 11 | 45 | 569 | 583 | 597 | 611 | 625 | 639 | 653 | 667 | 681 | 694 |
| | 1 | 3 | 4 | 6 | 7 | 9 | 10 | 11 | 46 | 582 | 596 | 610 | 625 | 639 | 653 | 667 | 681 | 696 | 710 |
| | 1 | 3 | 4 | 6 | 7 | 9 | 10 | 12 | 47 | 595 | 609 | 624 | 638 | 653 | 667 | 682 | 696 | 711 | 725 |
| | 1 | 3 | 4 | 6 | 7 | 9 | 10 | 12 | 48 | 607 | 622 | 637 | 652 | 667 | 681 | 696 | 711 | 726 | 741 |
| | 2 | 3 | 5 | 6 | 8 | 9 | 11 | 12 | 49 | 620 | 635 | 650 | 665 | 681 | 696 | 711 | 726 | 741 | 756 |
| | 2 | 3 | 5 | 6 | 8 | 9 | 11 | 12 | 50 | 633 | 648 | 664 | 679 | 694 | 710 | 725 | 741 | 756 | 772 |
| .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |

| Correction for tenths of width′— width. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 |
| 0.2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 0.3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 |
| 0.4 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 6 |
| 0.5 | 6 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 8 | 8 |
| 0.6 | 8 | 8 | 8 | 8 | 8 | 9 | 9 | 9 | 9 | 9 |
| 0.7 | 9 | 9 | 9 | 10 | 10 | 10 | 10 | 10 | 11 | 11 |
| 0.8 | 10 | 10 | 11 | 11 | 11 | 11 | 12 | 12 | 12 | 12 |
| 0.9 | 11 | 12 | 12 | 12 | 13 | 13 | 13 | 13 | 14 | 14 |

T... may be kept

89080456320

B89080456320A